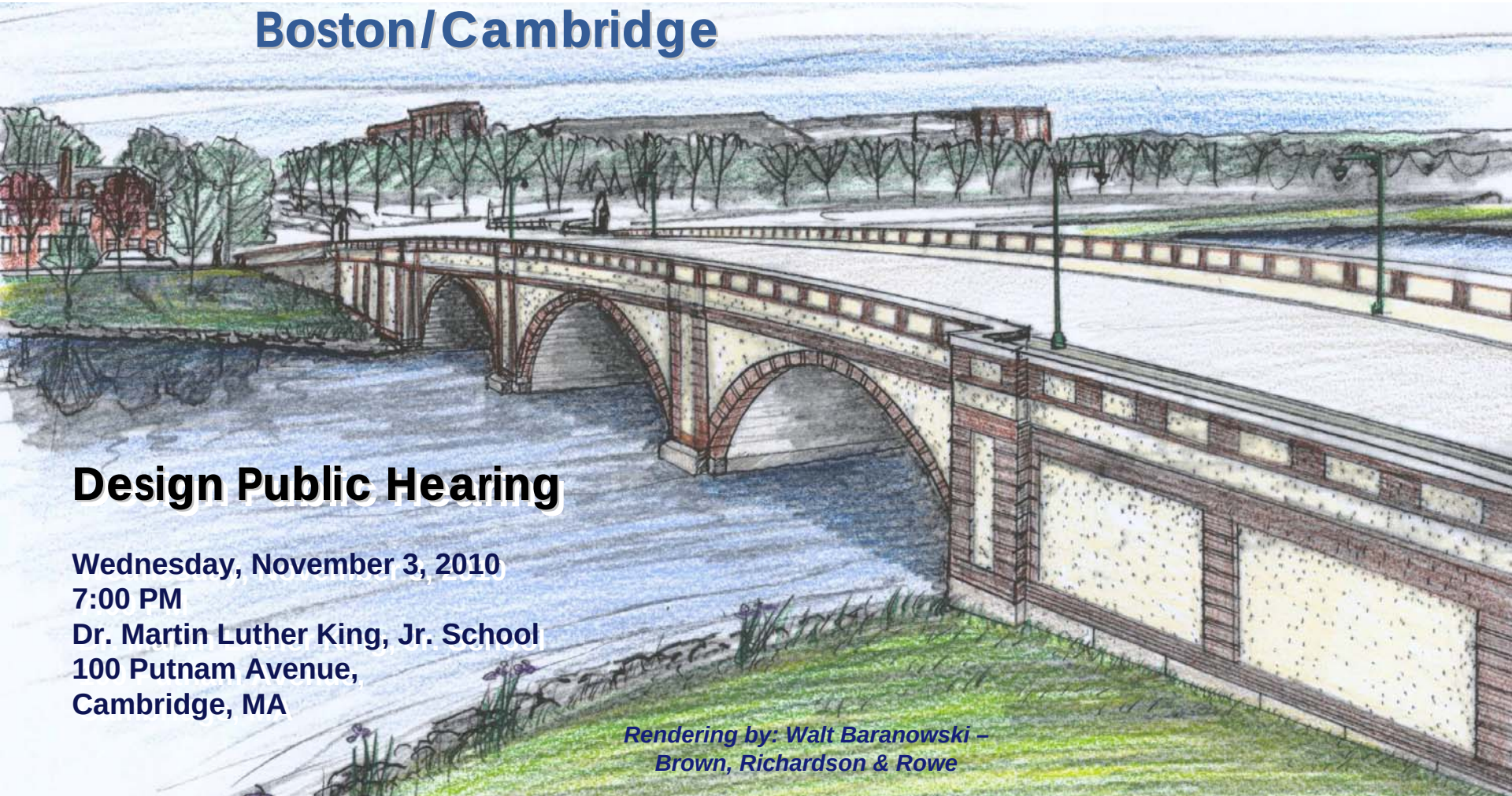
massDOT
Massachusetts Department of Transportation
Highway Division

ACCELERATED BRIDGE PROGRAM

Anderson Memorial Bridge Rehabilitation Project

Boston/Cambridge



Design Public Hearing

Wednesday, November 3, 2010
7:00 PM
Dr. Martin Luther King, Jr. School
100 Putnam Avenue,
Cambridge, MA

Rendering by: Walt Baranowski – Brown, Richardson & Rowe

Agenda

- Accelerated Bridge Program Overview
- Charles River Basin Projects
- Anderson Memorial Bridge Rehabilitation
- Discussion

Program Overview

- **Authorization:**
  - Chapter 233 of the Acts of 2008
  - Program must be complete by 2016

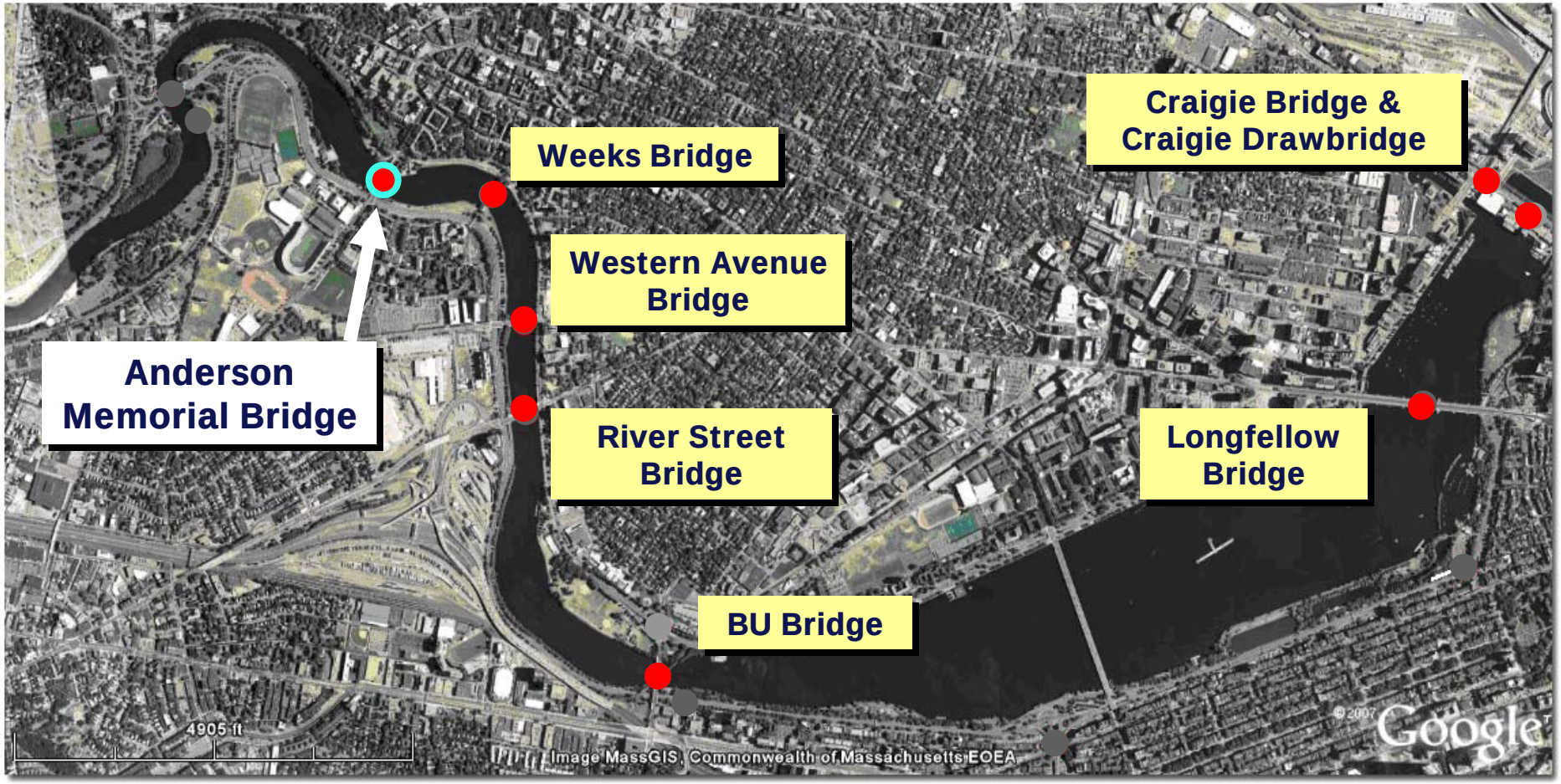
- **Program Goals:**
  - Improve the Condition of the Commonwealth's Bridges
  - Stimulate Economic Development and Job Creation
  - Save Money by Completing Projects Sooner
  - Complete Projects Efficiently and Innovatively
  - Provide Access and Opportunity for All
  - Manage with Transparency and Accountability

Program Overview- 8 years only

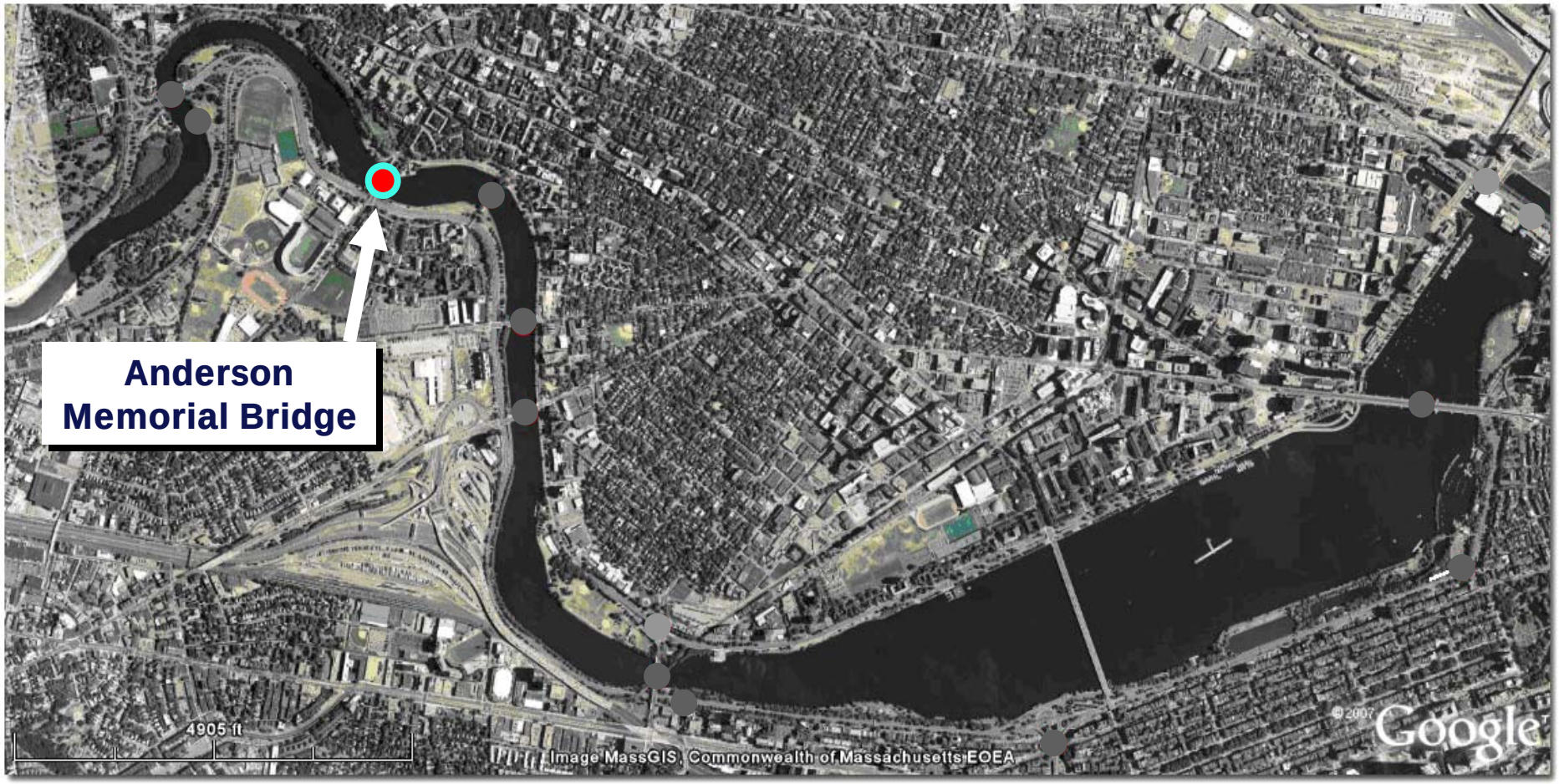
- **Size and Scope**
  - Former MassHighway: $2.078 billion
    - rehabilitation or replacement of 189 bridges
    - preservation of 305 bridges
  - Former DCR: $906 million
    - rehabilitation or replacement of 29 bridges
    - preservation of 50 bridges

MassDOT Total Program: $2,984,000,000

Anderson Memorial Bridge



Anderson Memorial Bridge



Key Meetings

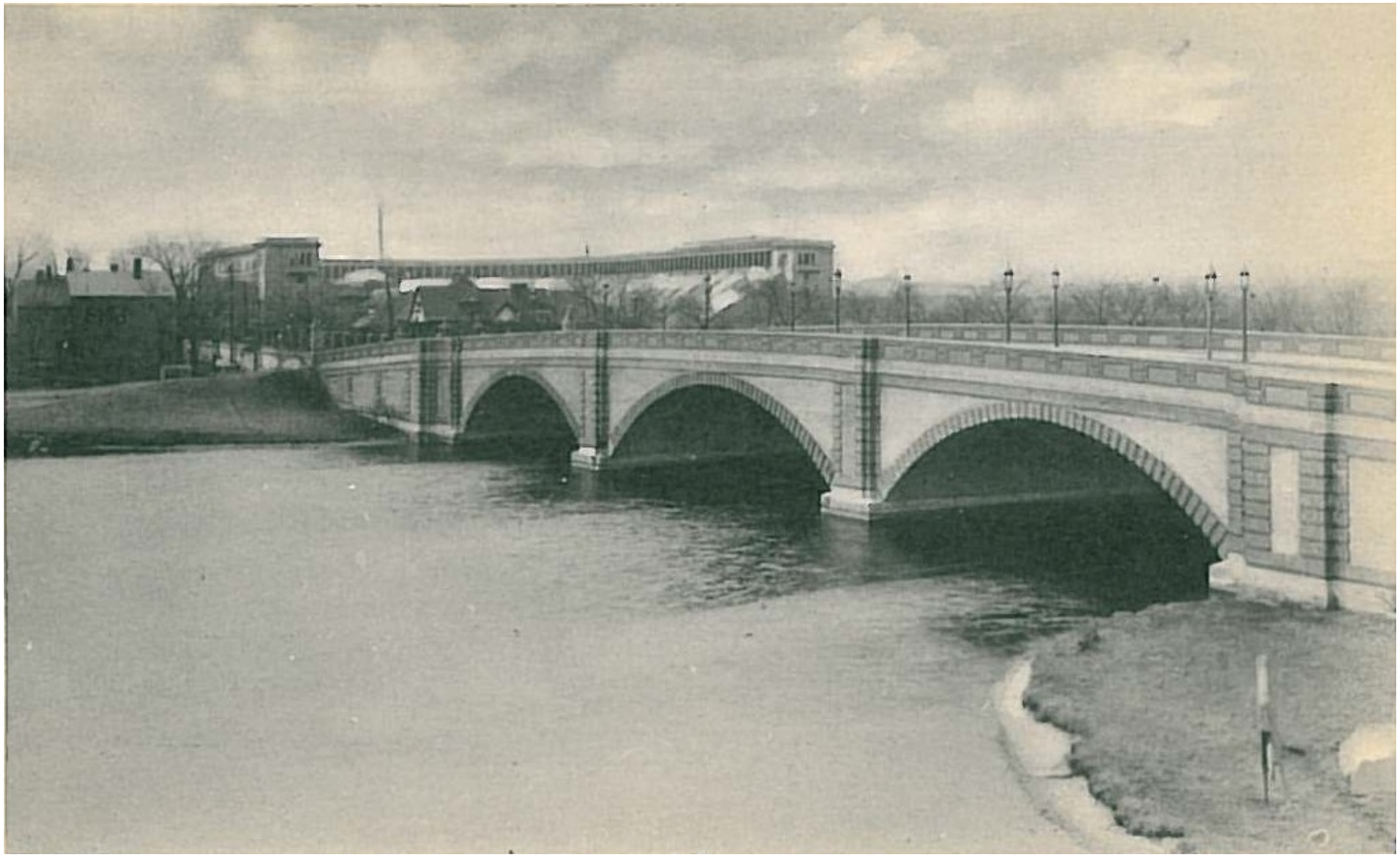
- **Public Informational Meeting**
  - December 15, 2009
  - July 22, 2010
- **Stakeholder Meetings**
  - December 22, 2009
  - June 18, 2010
  - July 19, 2010
  - September 30, 2010
  - October 26, 2010
  - October 27, 2010

Anderson Memorial Bridge
Key Plan

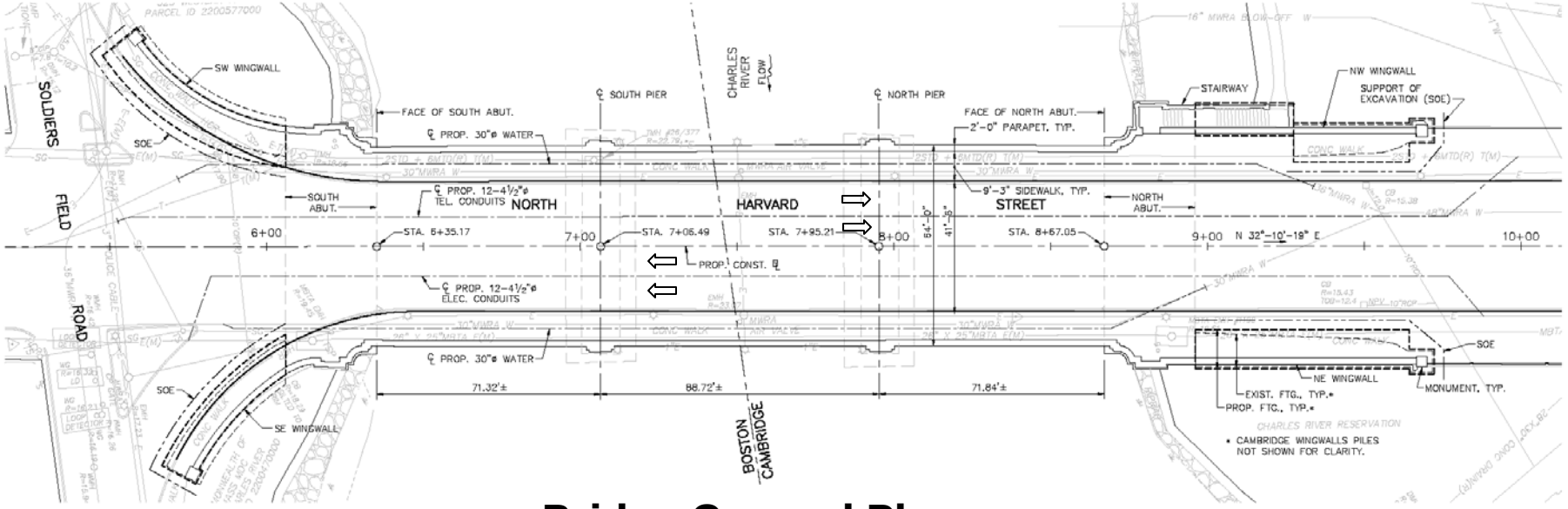
Existing Bridge

- Three-span earth filled concrete arch bridge
- 440 feet long (including approaches)
- Two 10-foot lanes each way
- 10-foot sidewalks on each side of the bridge
- Built in 1913
- Historic Bridge
  - Listed on State and National Registers of Historic Places
  - Integral component of historic Charles River Basin

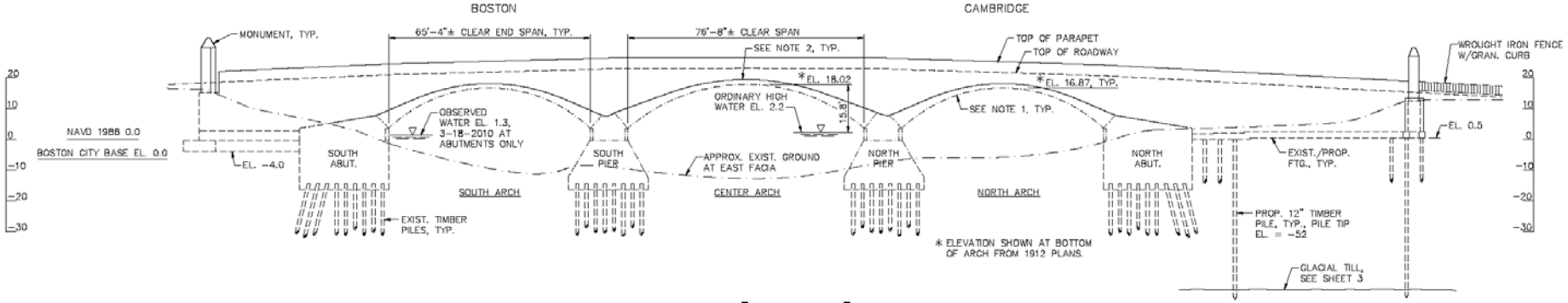
Anderson Memorial Bridge



ca. 1915 Historic Postcard



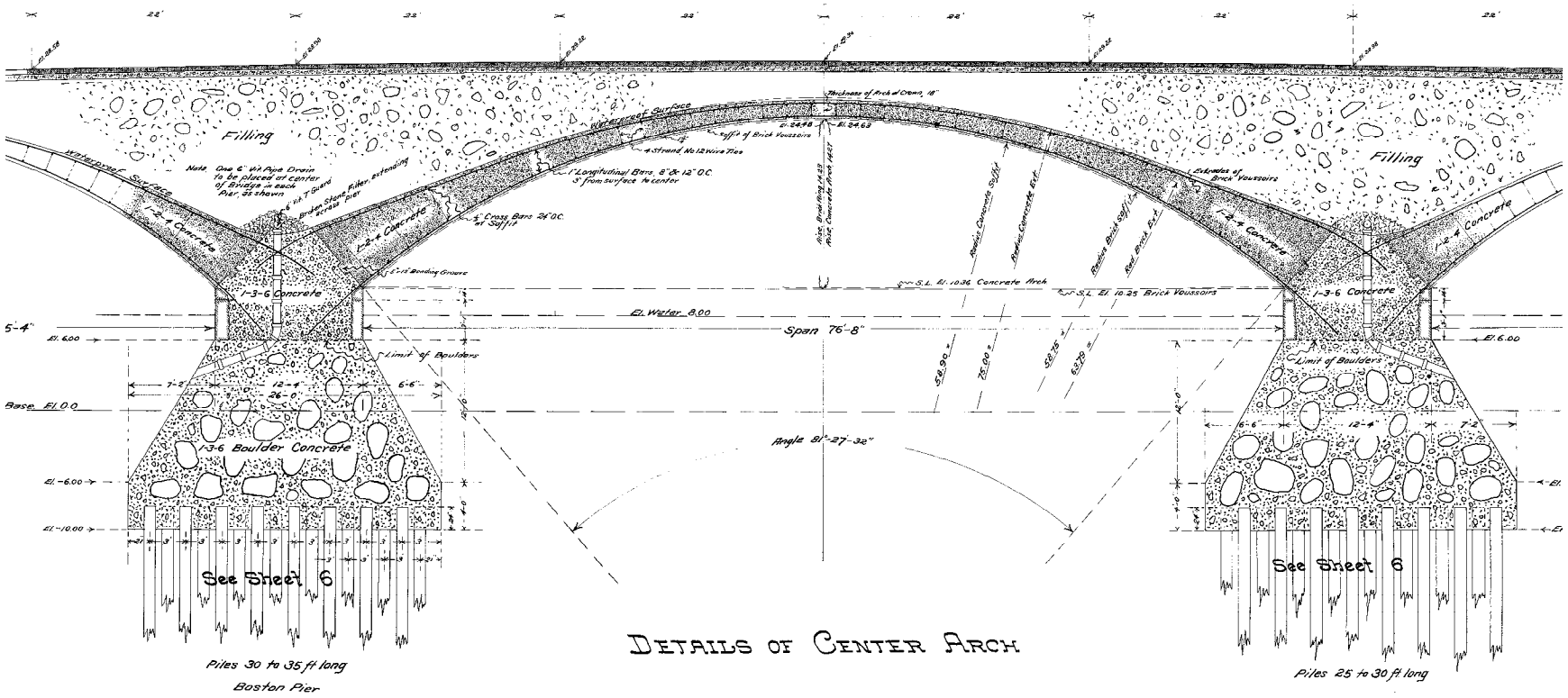
Bridge General Plan



East Elevation

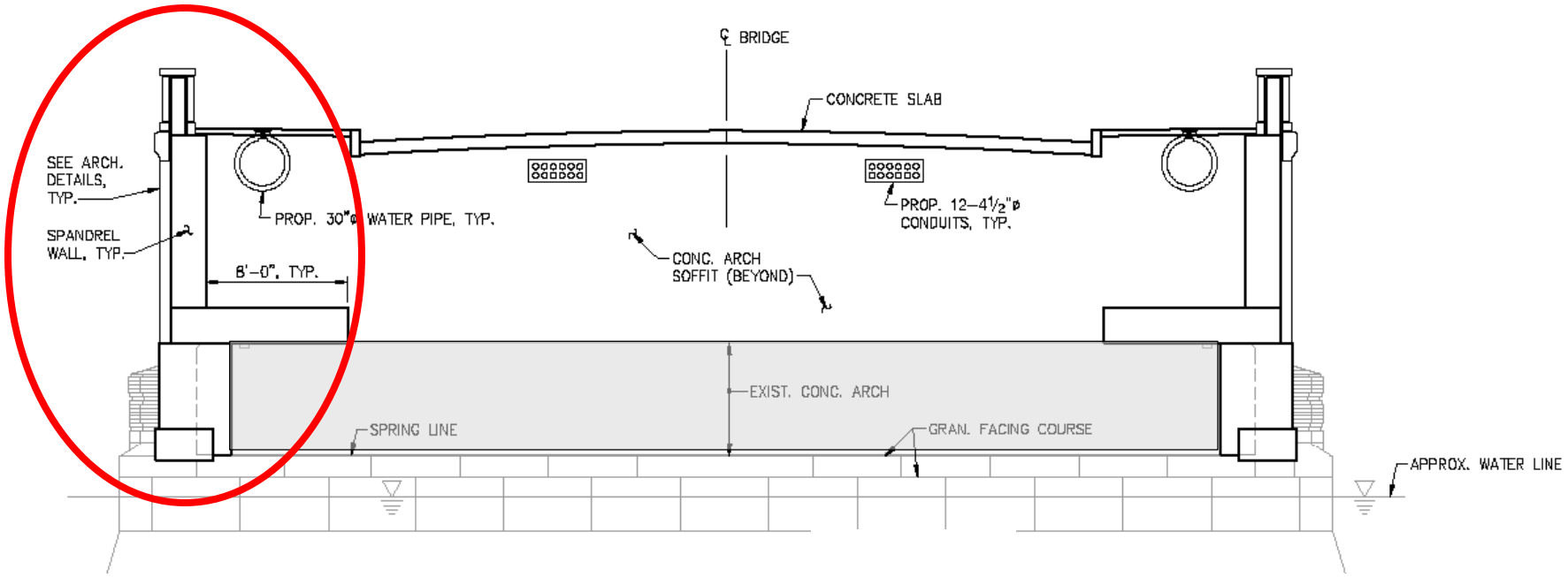
Existing Bridge

Longitudinal Section at Center Arch



DETAILS OF CENTER ARCH

Proposed Cross-Section at Pier / Abutment



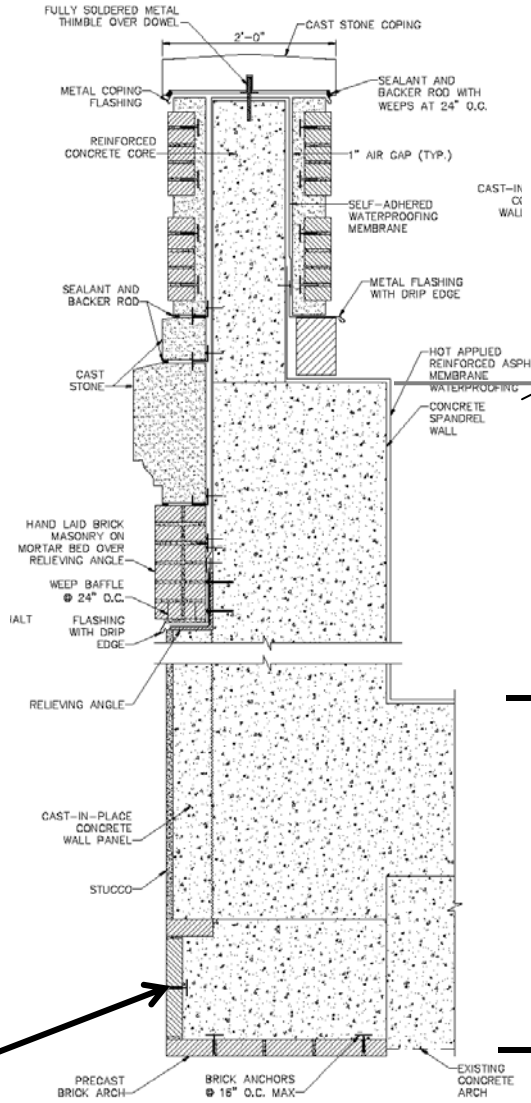
Section at Spandrel Wall

Parapet

Spandrel Wall

Concrete Arch

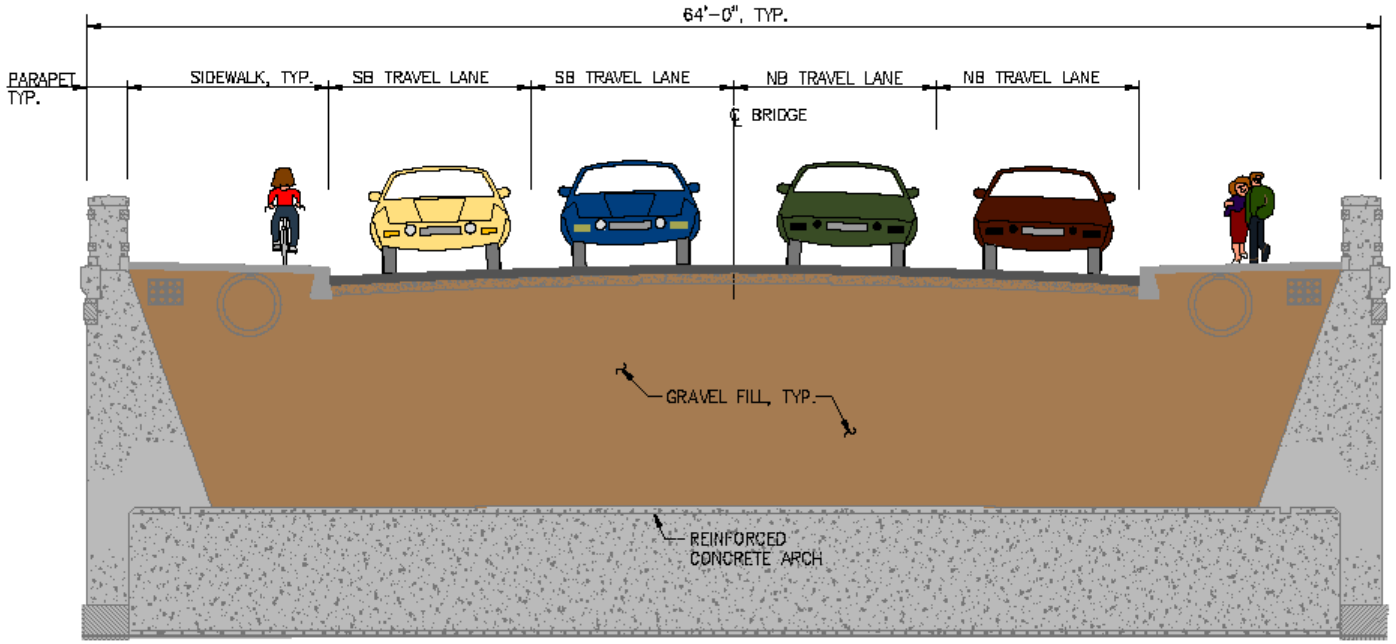
Brick Arch Ring



Staged Construction

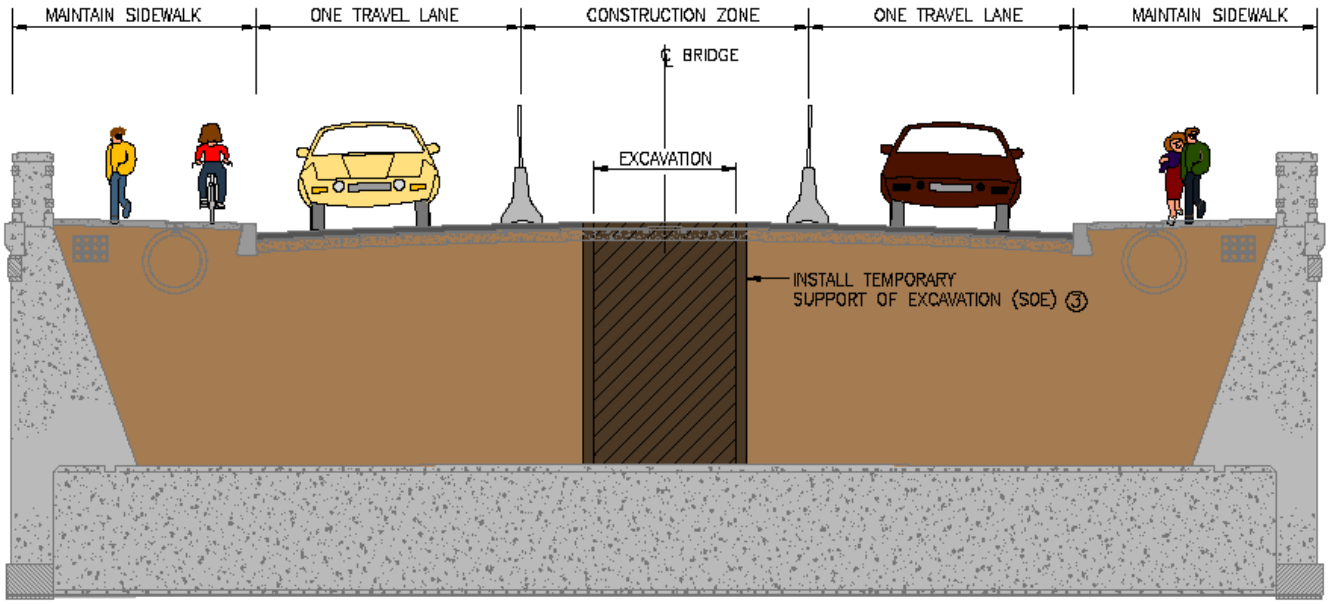
Existing Roadway Section

(Construction Duration = 24 Months)



EXISTING SECTION
(LOOKING NORTH TO CAMBRIDGE)

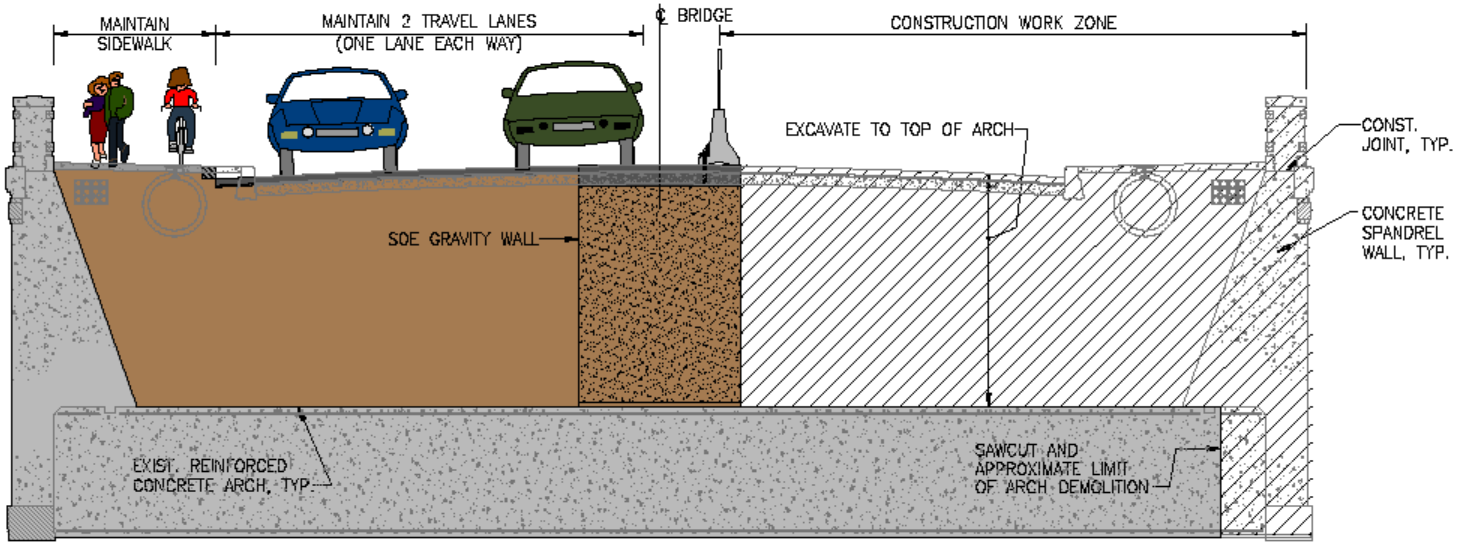
Stage 1
Rehab Middle Section of Bridge



CONSTRUCTION STAGE 1
(LOOKING NORTH TO CAMBRIDGE)

Stage 2

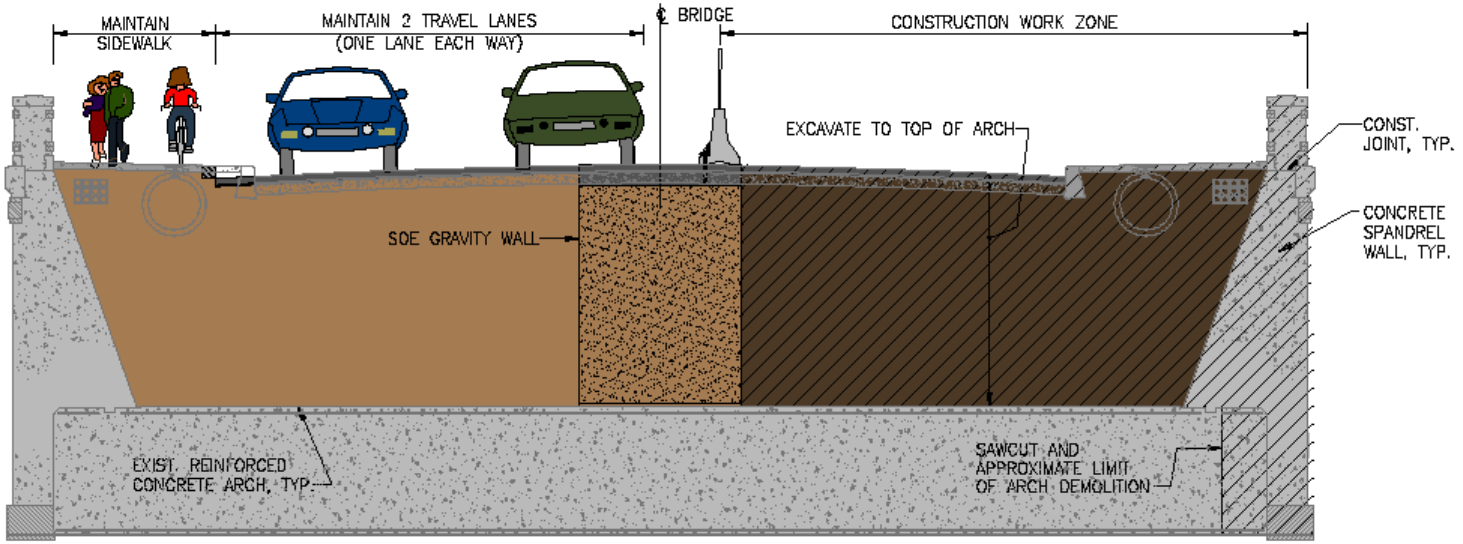
Rehab East Side (Downstream) of Bridge



CONSTRUCTION STAGE 2
(LOOKING NORTH TO CAMBRIDGE)

Stage 2

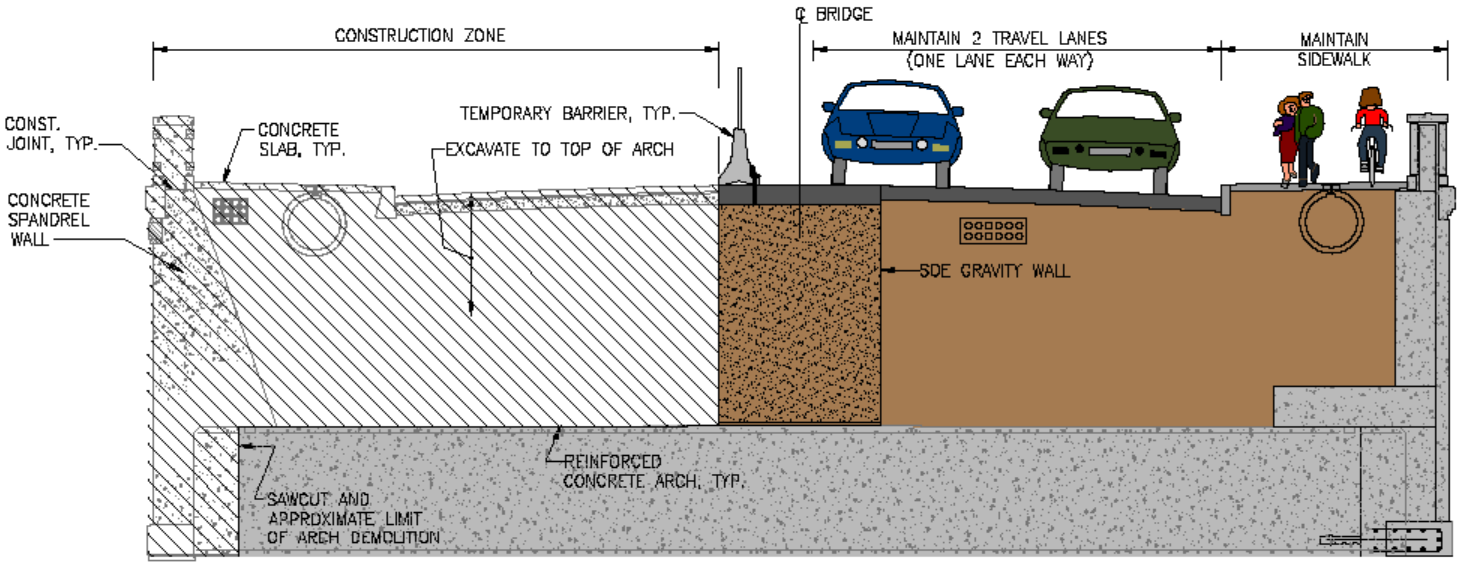
Rehab East Side (Downstream) of Bridge



CONSTRUCTION STAGE 2
(LOOKING NORTH TO CAMBRIDGE)

Stage 3

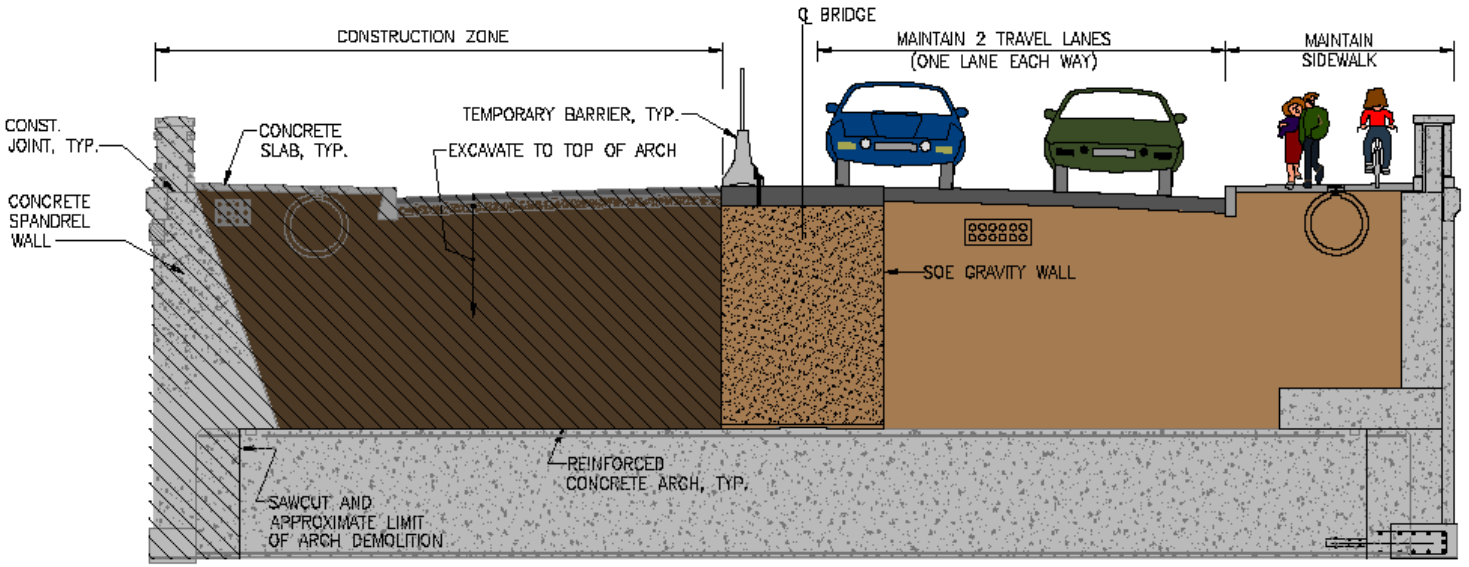
Rehab West Side (Upstream) of Bridge



CONSTRUCTION STAGE 3
(LOOKING NORTH TO CAMBRIDGE)

Stage 3

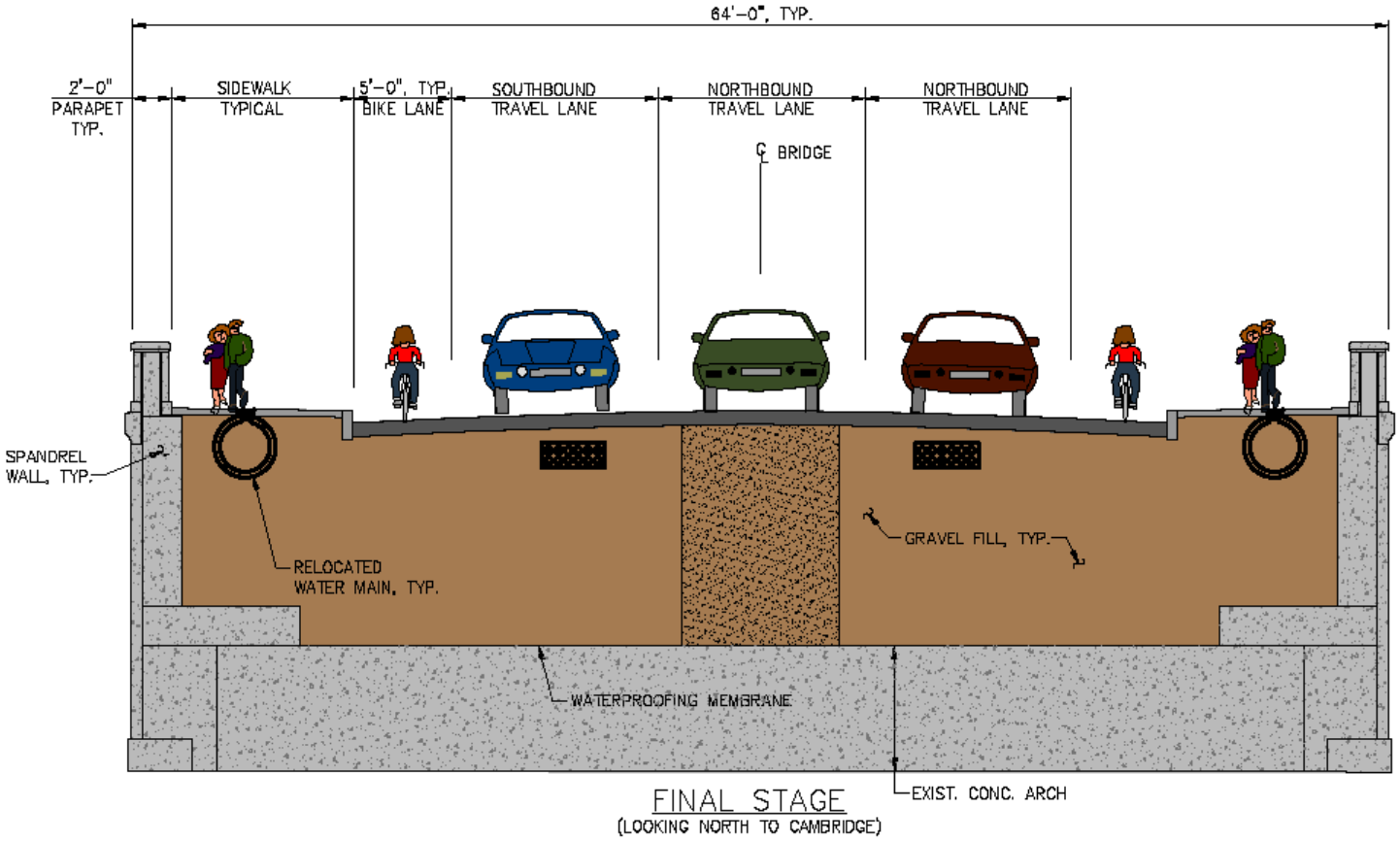
Rehab West Side (Upstream) of Bridge



CONSTRUCTION STAGE 3
(LOOKING NORTH TO CAMBRIDGE)

Stage 4

Complete Road Construction

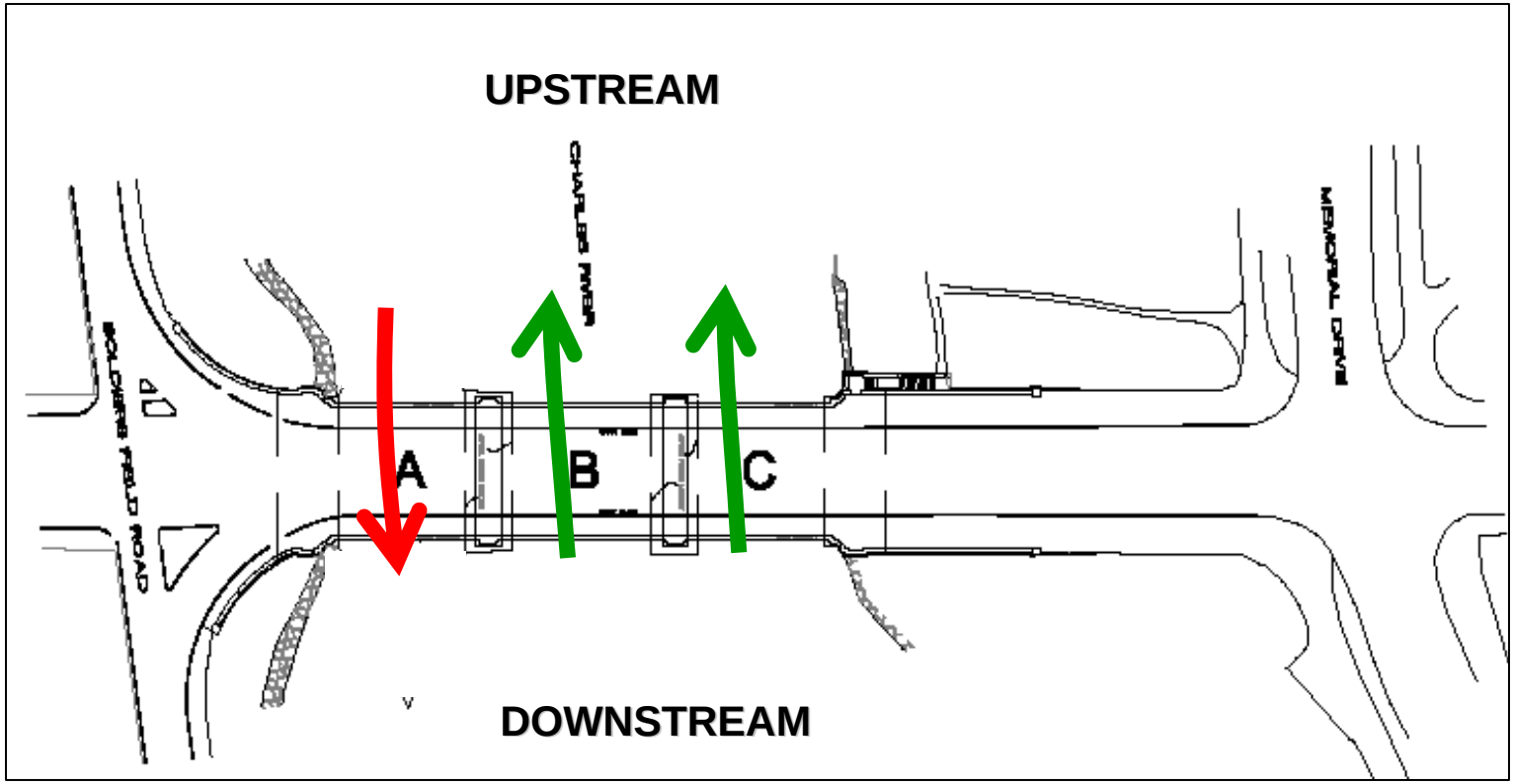


Construction Staging in the River

- **Construction staging for the work in the River is required to rehabilitate the arches**
- **Key staging elements include:**
  - Limit work such that only one arch barrel at a time is closed for concrete repairs
  - Minimize the duration of any temporary vertical clearance reductions
  - Sequence the construction to minimize the impact
  - Safety measures for boaters will include advance notification to users and warning buoys

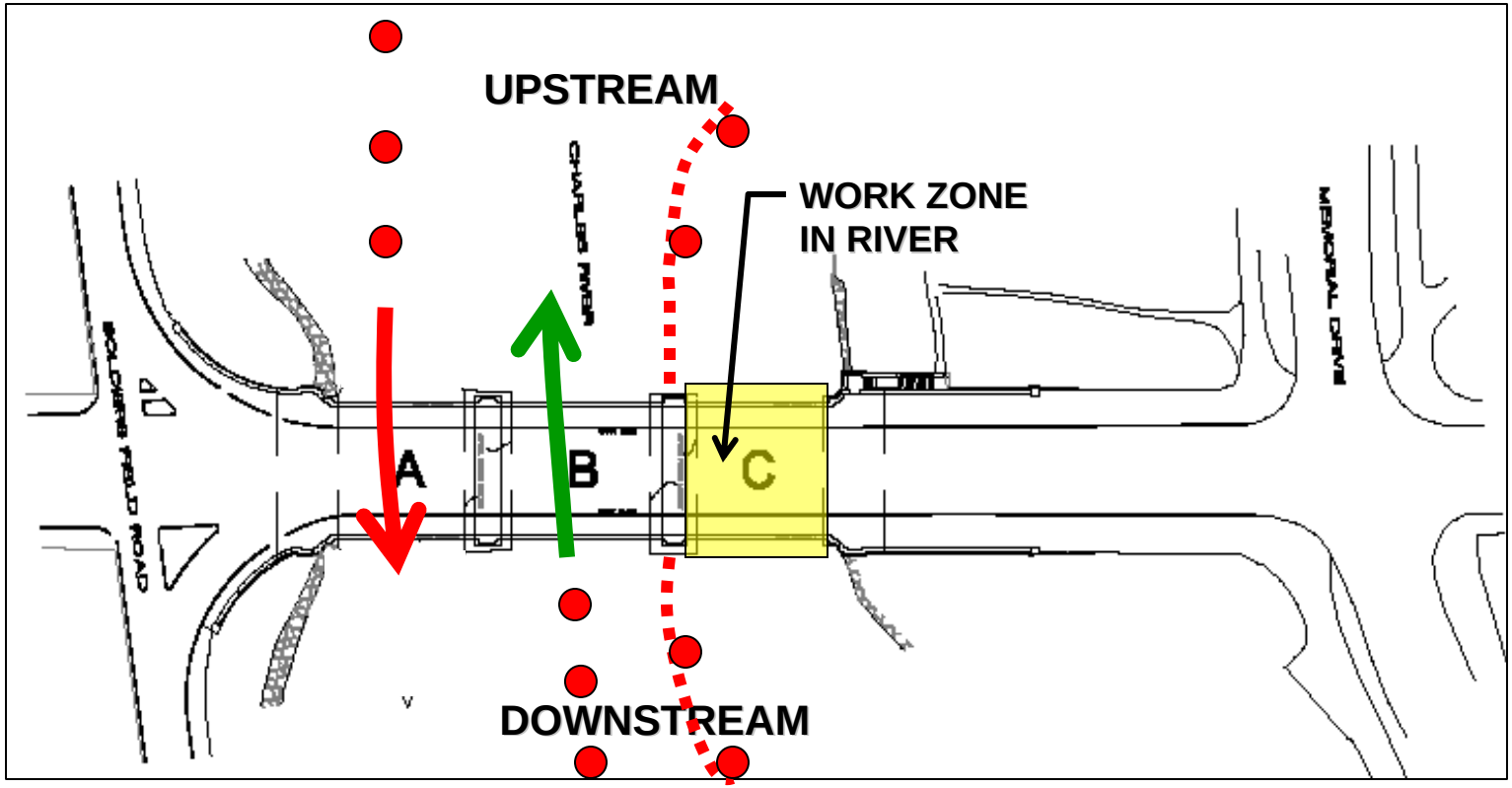
Construction Staging in the River

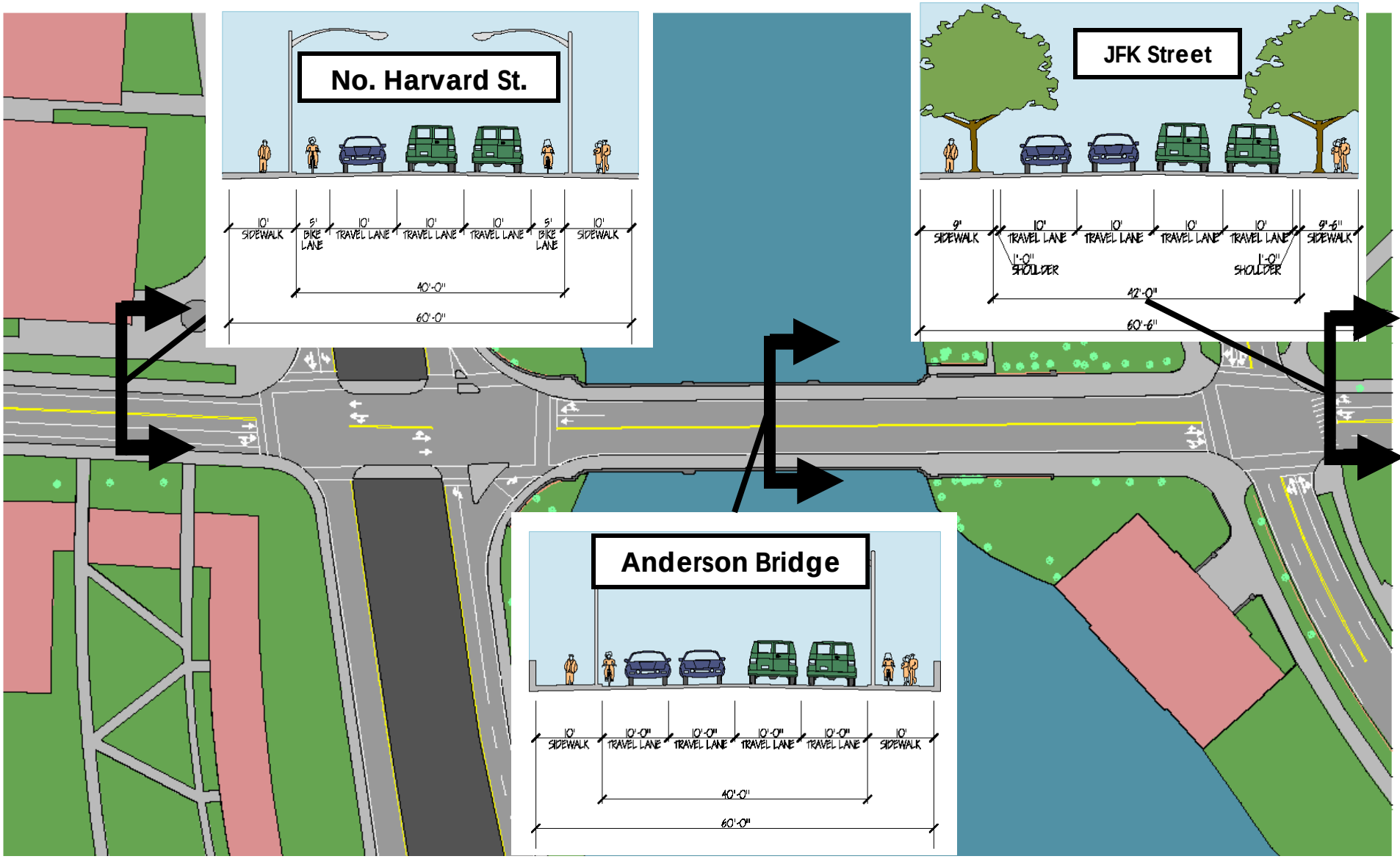
Existing Rowing Traffic Patterns



Construction Staging in the River

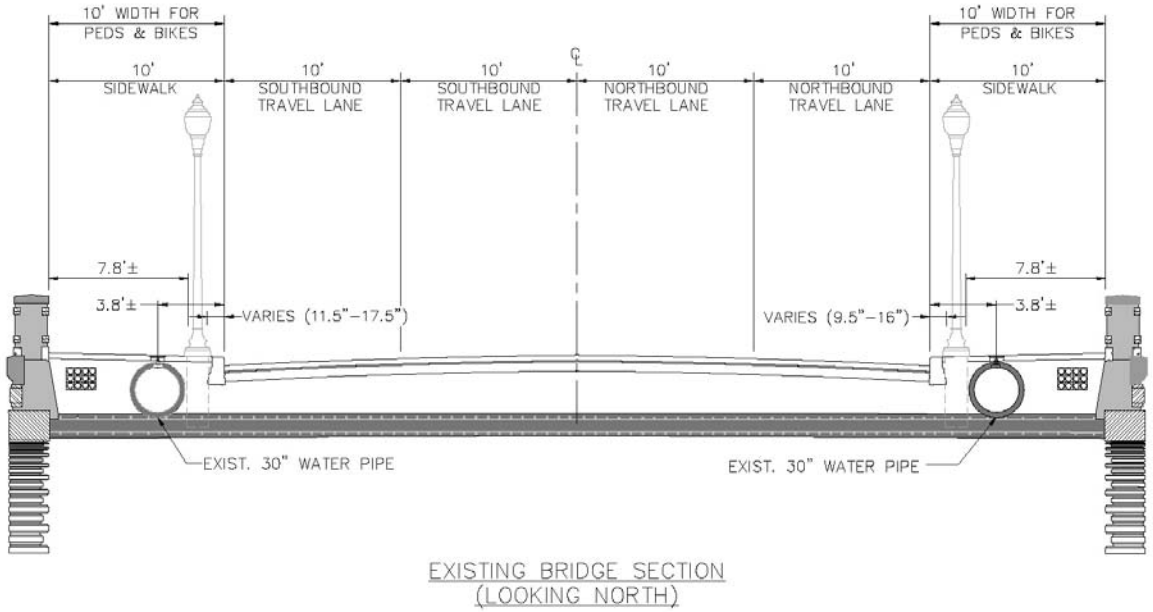
Warning Buoys Requirements





EXISTING ROADWAY SECTIONS

Existing Cross Section



EXISTING BRIDGE SECTION
(LOOKING NORTH)

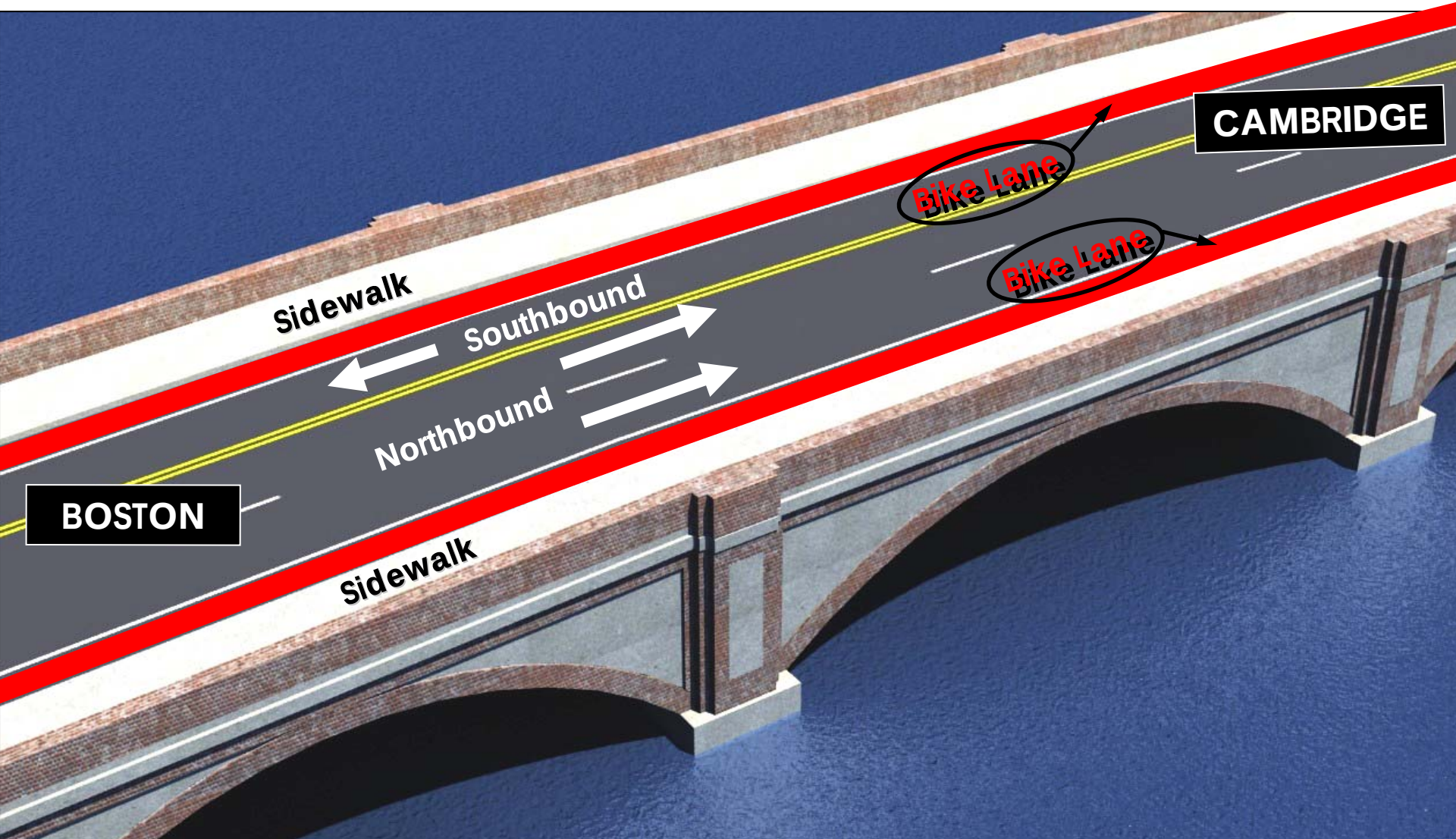
Existing Conditions

- 60 Foot Bridge Width
- 40 Foot Roadway Width (4 lanes)
- 2 – 10 foot Wide Sidewalks (For Pedestrians and Bicyclists)

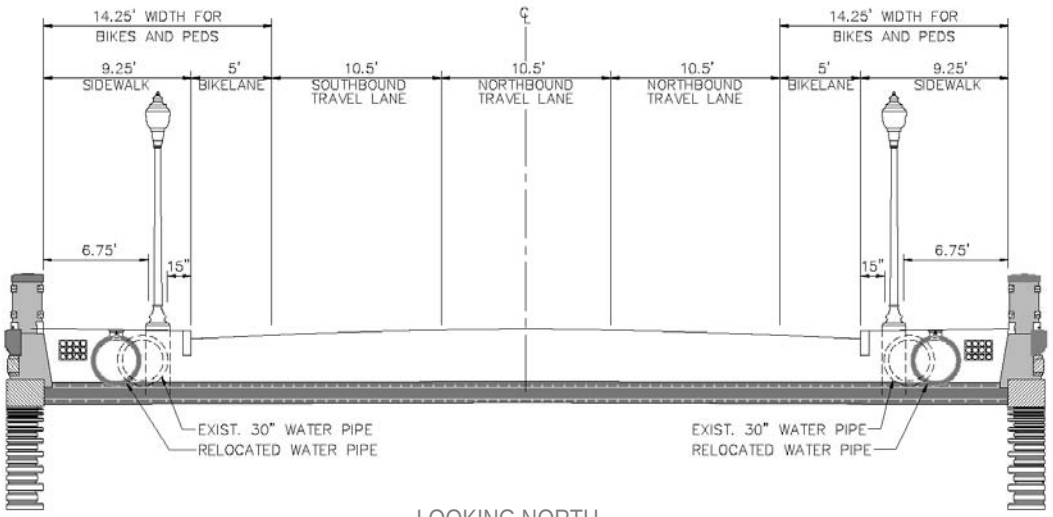
Volumes

- 1655/1810 VPH (AM/PM)
- 145/222 BPH (AM/PM)
- 355/877 PPH (AM/PM)

Proposed Roadway Section w/Bike Lanes



Proposed Cross Section



Existing Conditions

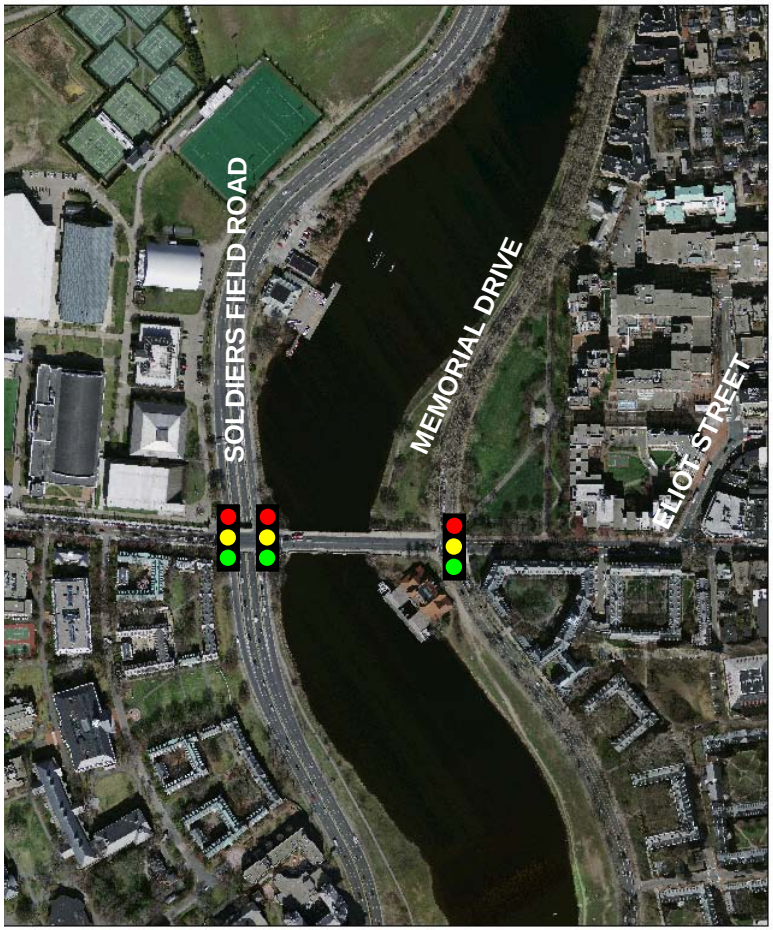
- 60 Feet Bridge Width
- 40 Feet Roadway Width (4 lanes)
- 20 Feet for Pedestrians and Bicyclists

Proposed

- 60 Feet Bridge Width
- 31.5 Feet for Vehicles (3 lanes)
- 28.5 Feet for Pedestrians and Bicyclists

Study Area

BOSTON



CAMBRIDGE

Traffic Analysis

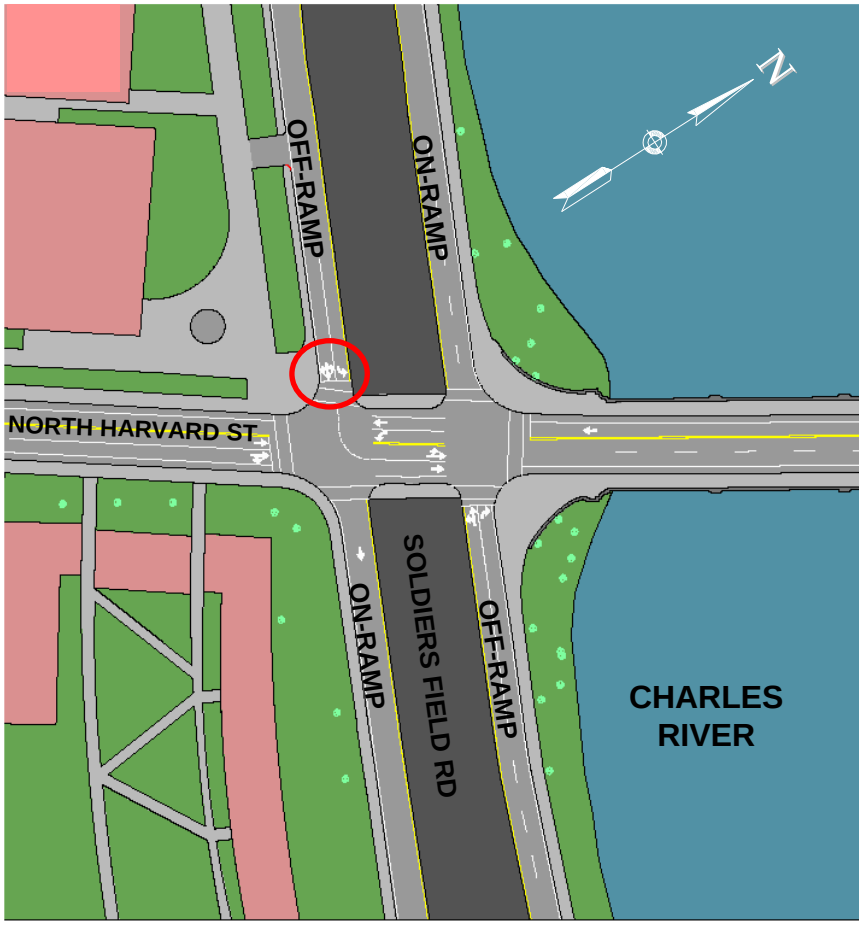
- **Traffic Analysis is based on:**
  - Future Traffic Volumes
  - Standard DOT Procedures
- **Includes:**
  - Pedestrian Crossings
  - Bicycle Accommodations
  - Peak and off-peak periods

Key Design Elements

1. **Cross section approved by MassDOT**
   - Travel lane widths – Bike lane widths – Sidewalk considerations
2. **Abutting intersections will require modifications**
   - Memorial Drive/JFK Street
   - North Harvard Street/Soldiers Field Road (2 Locations)
3. **Revised Traffic Signals**
   - Timing and phasing
   - Pedestrian crossing accommodations
   - Bike crossing accommodations
4. **Accessibility**
   - ADA

Proposed Improvements

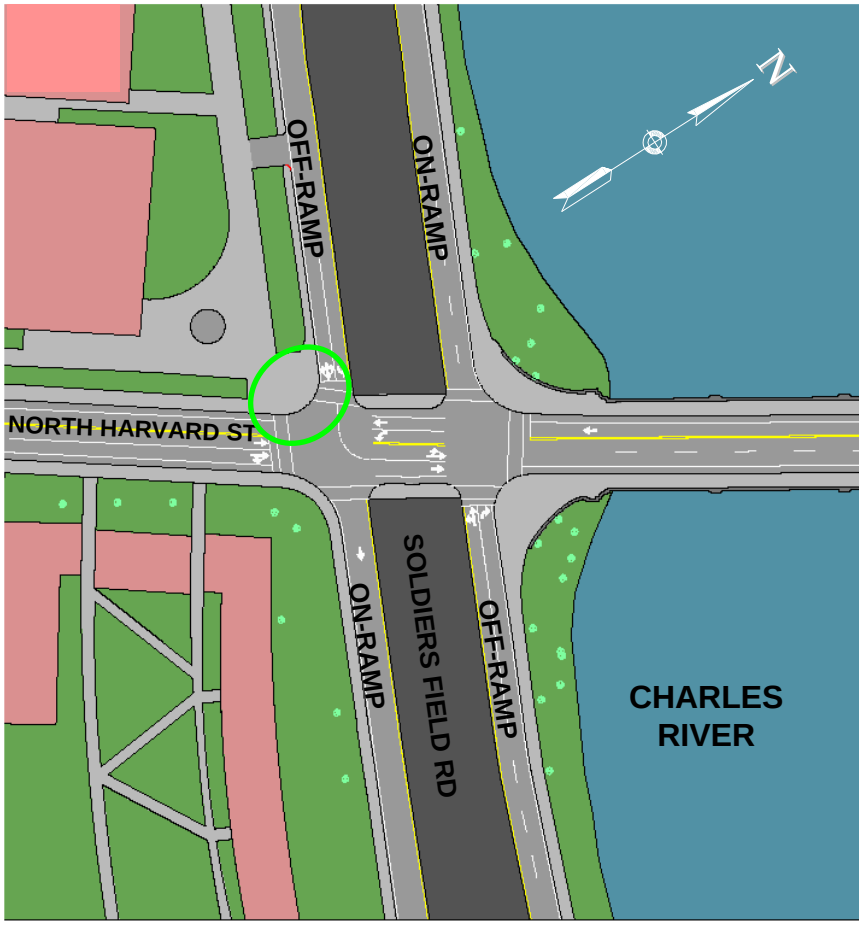
Soldiers Field Road/North Harvard Street



- Add additional turn lane opportunity on Soldiers Field Road eastbound off-ramp to North Harvard St northbound

Proposed Improvements

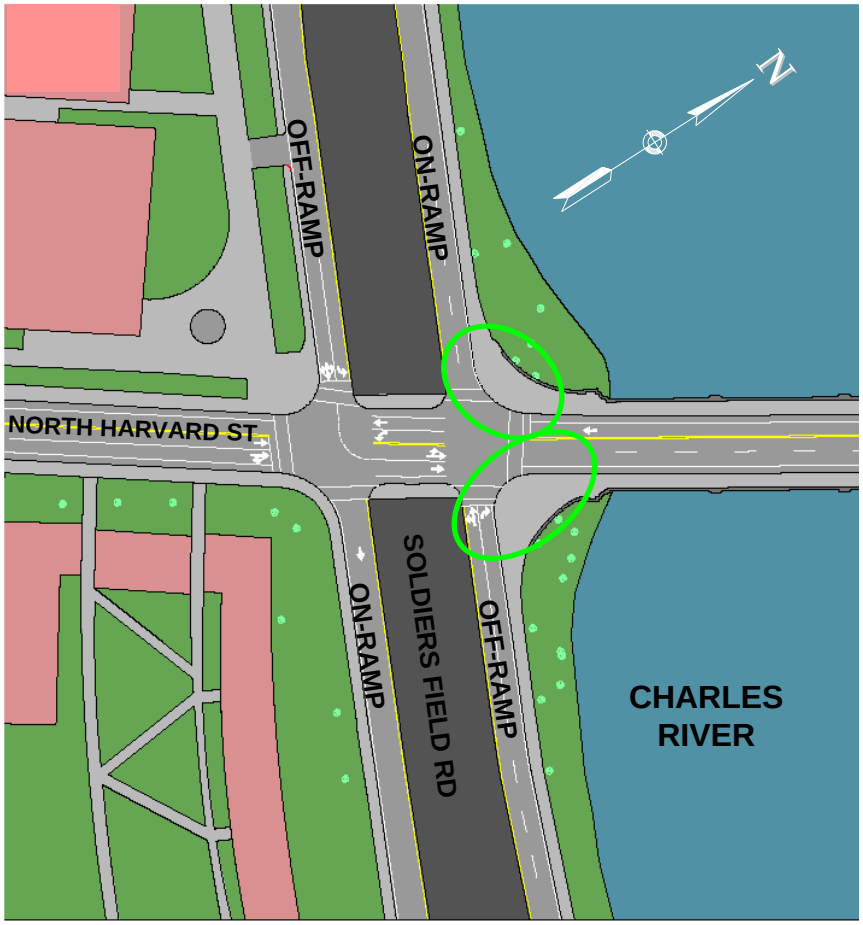
Soldiers Field Road/North Harvard Street



- Add additional turn lane opportunity on Soldiers Field Road eastbound off-ramp to North Harvard St northbound
- Improve corner radius for enhanced pedestrian mobility

Proposed Improvements

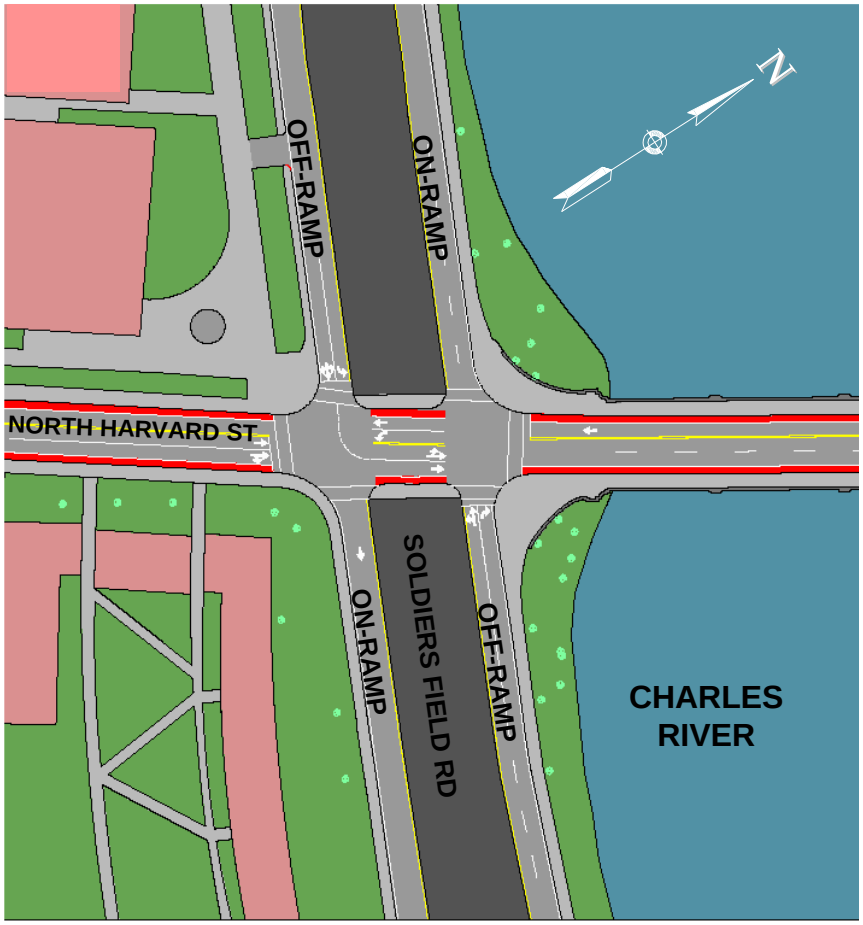
Soldiers Field Road/North Harvard Street



- Add additional turn lane opportunity on Soldiers Field Road eastbound off-ramp to North Harvard St northbound
- Improve corner radius for enhanced pedestrian mobility
- Eliminate raised "Delta" islands at Soldiers Field Rd westbound on and off-ramp and widen corner curb

Proposed Improvements

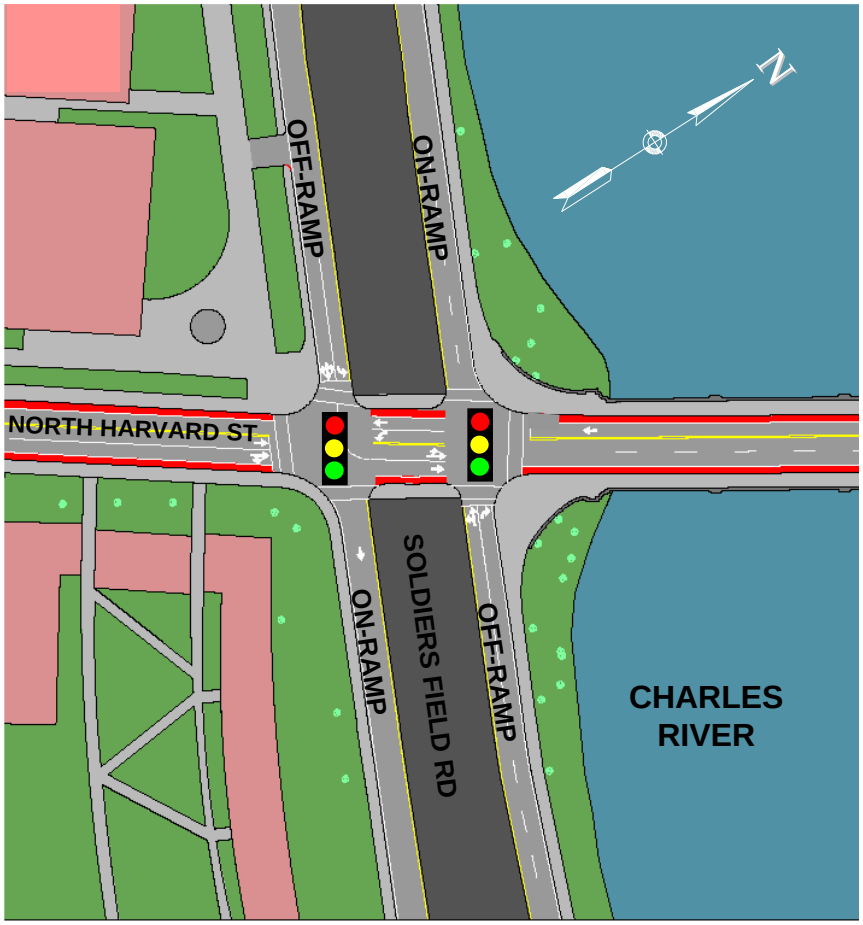
Soldiers Field Road/North Harvard Street



- Modify bridge cross section to include bike lanes, 1 southbound lane, and 2 northbound lanes

Proposed Improvements

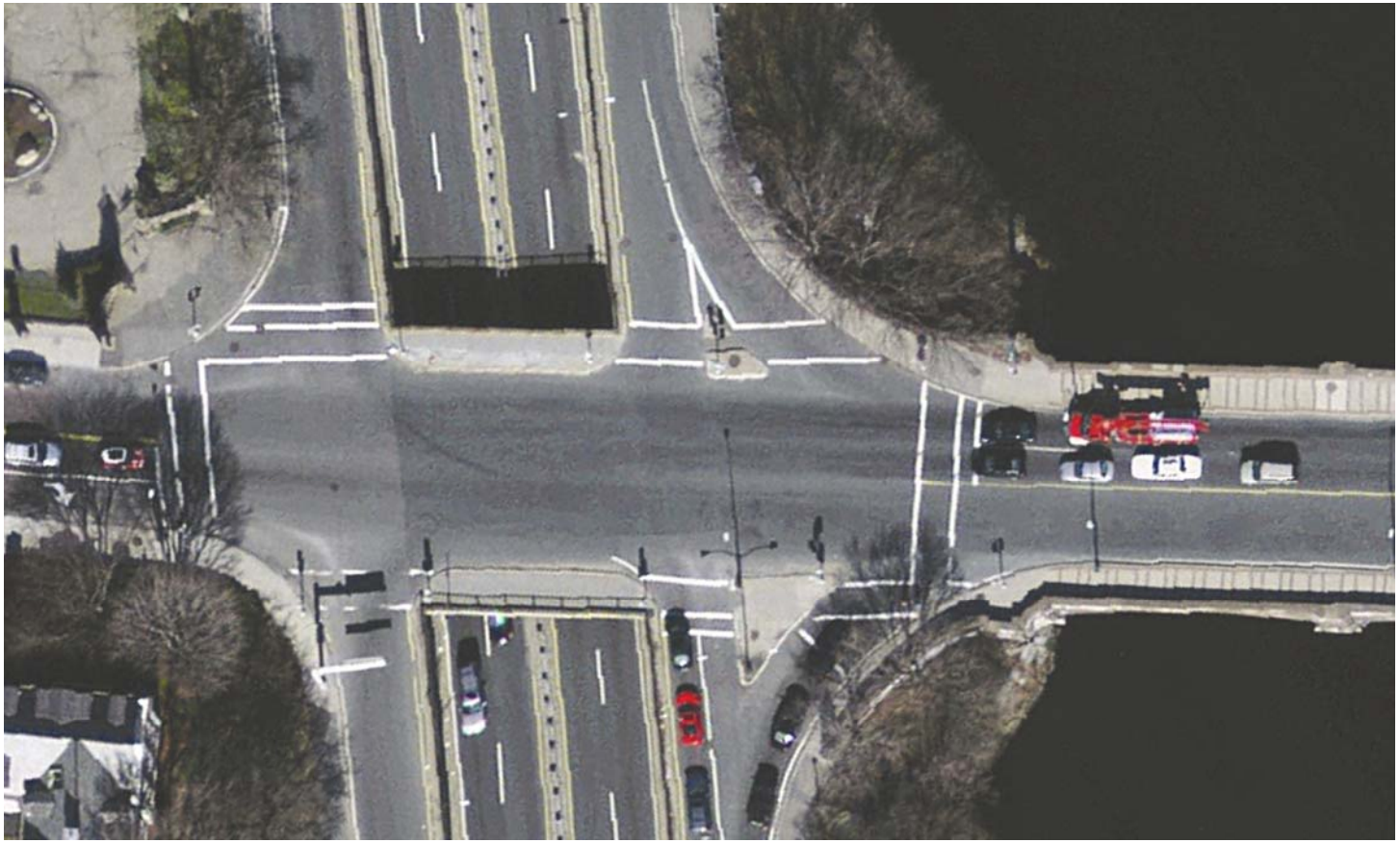
Soldiers Field Road/North Harvard Street



- Modify bridge cross section to include bike lanes, 1 southbound lane, and 2 northbound lanes
- Modify signal timing, phasing, and upgrade traffic signal to include leading pedestrian intervals

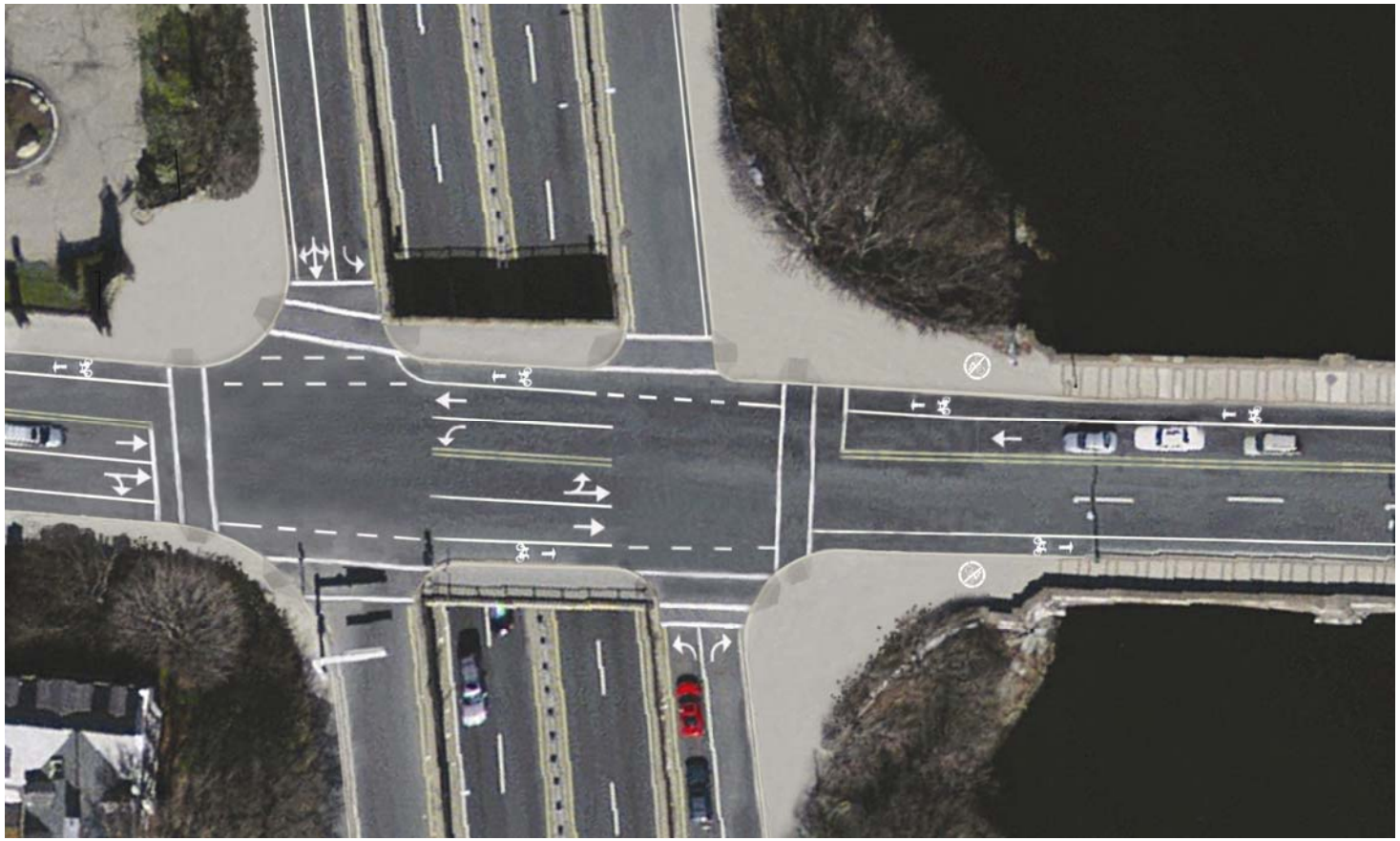
Proposed Improvements

Soldiers Field Road/North Harvard Street



Proposed Improvements

Soldiers Field Road/North Harvard Street



Existing Conditions

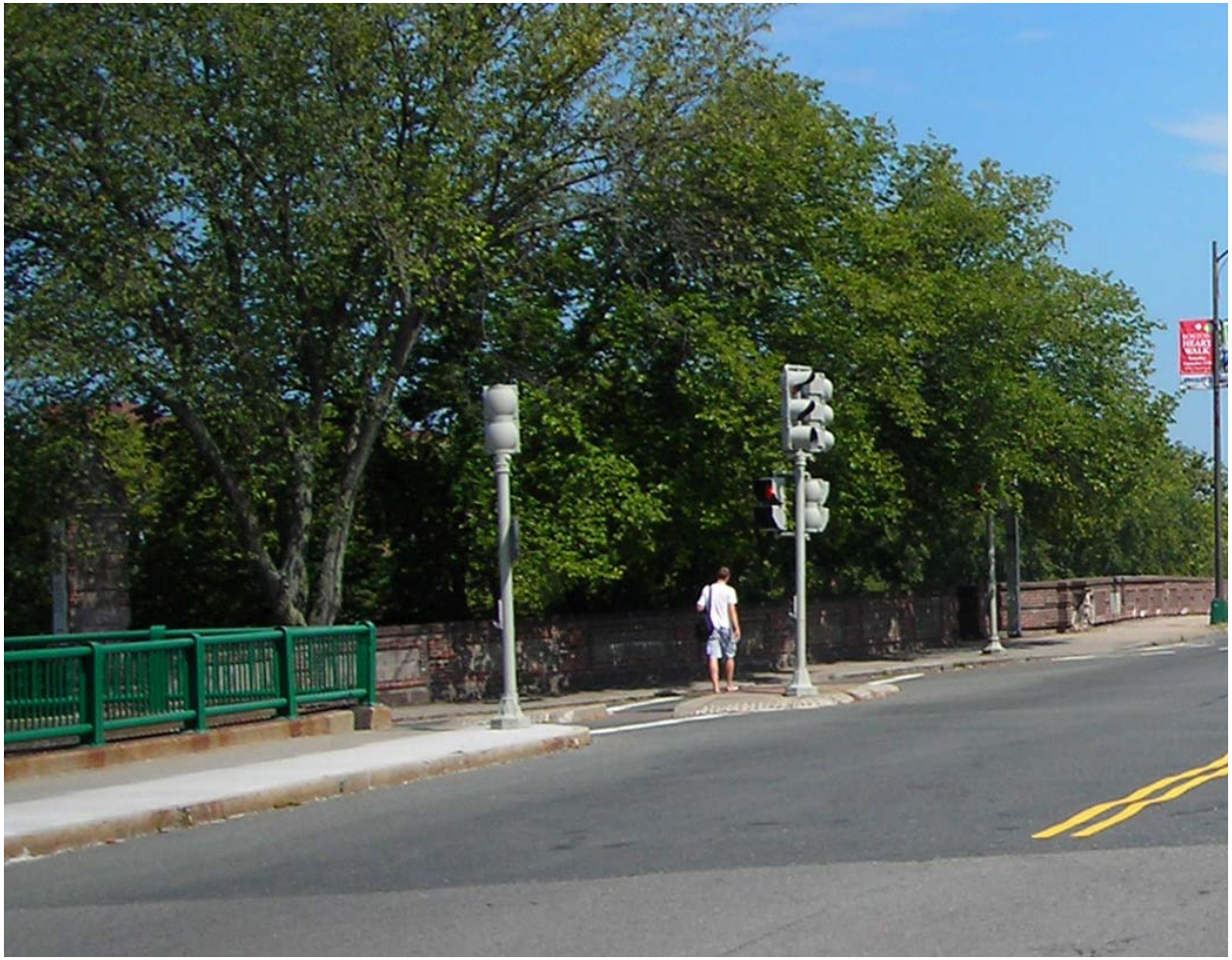
Soldiers Field Road/North Harvard Street

Proposed Improvements

Soldiers Field Road/North Harvard Street

Existing Conditions

Soldiers Field Road/North Harvard Street



Proposed Improvements

Soldiers Field Road/North Harvard Street

Existing Conditions

Soldiers Field Road/North Harvard Street

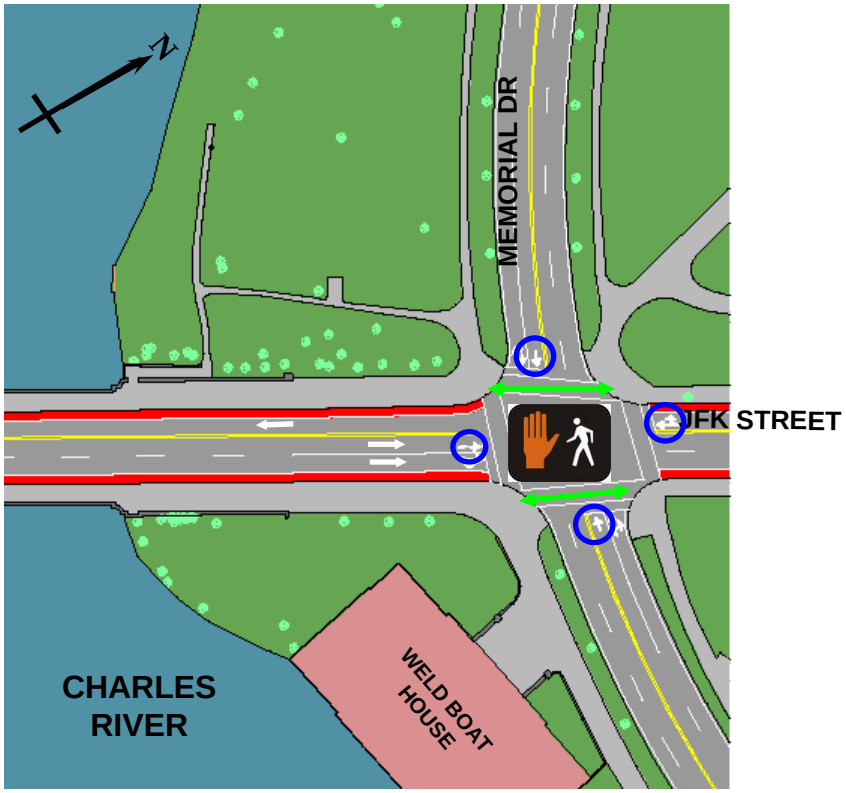
Proposed Improvements

Soldiers Field Road/North Harvard Street

Improved Pedestrian Access

Proposed Improvements

Memorial Drive/JFK Street



- Prohibit left turns
  - Both Memorial Drive left turns
  - JFK Street southbound left turns
  - North Harvard northbound lefts
- Modify bridge cross section to include bike lanes, 1 southbound travel lane, and 2 northbound travel lanes
- Implement concurrent pedestrian phasing and LPI, rather than exclusive phasing used today
- Modify traffic signal timing and phasing and upgrade equipment

Advantages of Transportation Improvements

Mode	Measure	Benefit
Pedestrians	Concurrent phasing and leading pedestrian interval	LPI allows pedestrians to start crossing before moving traffic. Concurrent phasing reduces the wait for the walk and lengthens the walk phase
	Elimination of raised delta islands at Soldiers Field Rd	Shorter crossing times, narrower crossing widths and less conflicts with vehicles
	Smaller corner radii at Soldiers Field Rd	Improved pedestrian crossing area
Bicycles	Dedicated north and south bike lanes added on Anderson Bridge	Removes bikes from sidewalks and eliminates conflicts with pedestrians. Bikes no longer share travel lane with vehicles
	Striped bike lanes	Provides connectivity with North Harvard Street and JFK Street
	Relocated pedestrian signal	Provides connectivity with bike path
Vehicles	Prohibited left turns at Memorial Drive/JFK St	Will eliminate left turn conflicts between vehicles and pedestrians and bicyclists. Reduce crashes. Shorten the vehicle queues. Allow the bridge to efficiently process the vehicle volume with the new cross section
	Interconnected and coordinated traffic signals at Storrow Drive and Soldier's Field Road	Improved vehicle operations and reduction in vehicle queues
	Upgraded signal timing and phasing	Reduced vehicle delays and queues

Stormwater Improvements

- **Existing roadway drainage directly discharges to the Charles River**
- **Opportunity to improve water quality and minimize impacts of stormwater runoff**
- **Address objectives of:**
  - **MassDOT Impaired Waterbodies Program**
  - **Lower Charles River Total Maximum Daily Load (TMDL) Implementation Plan**
  - **DEP Stormwater Management Standards**

Stormwater Improvements

Best Management Practices (BMPs)

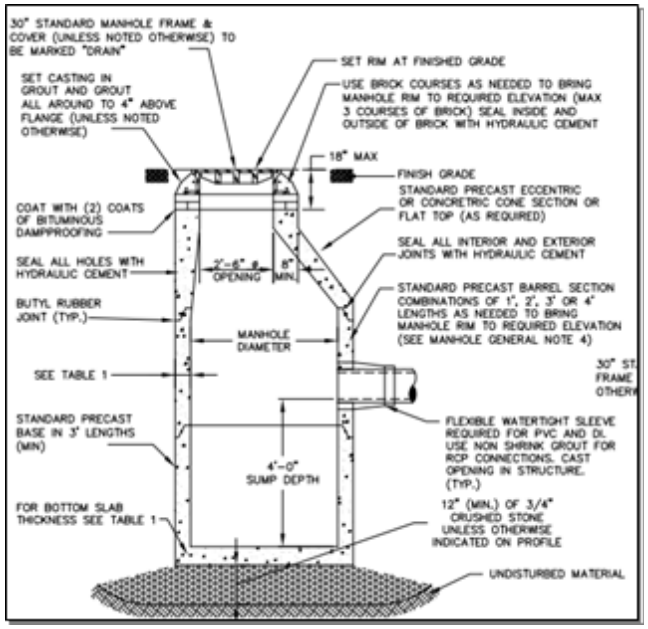
BMP selection & siting considerations:

- Site constraints
  - Topography
  - Depth to groundwater
  - Space requirements
- Physical setting
  - Historic landscape
  - Existing land uses
- Maintenance requirements
- Pollutant removal efficiencies

Stormwater Improvements

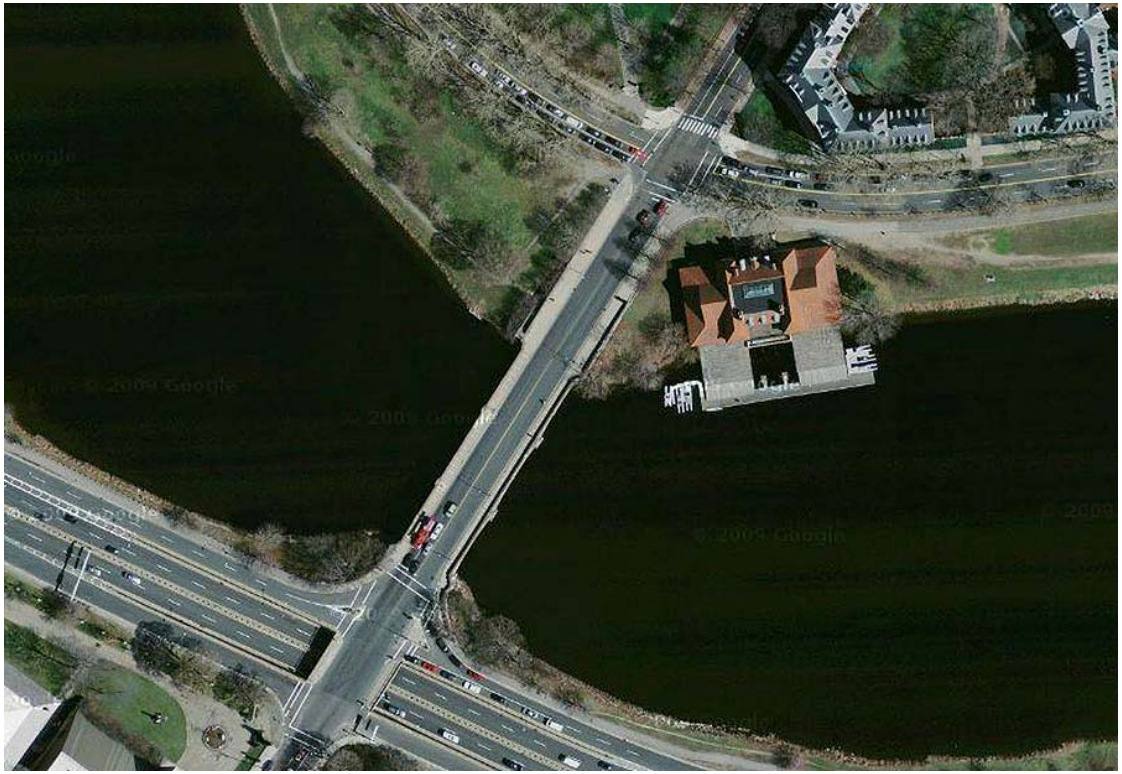
Types of Stormwater BMPs

- **Structural Pretreatment**
- **Additional On-Site Treatment**



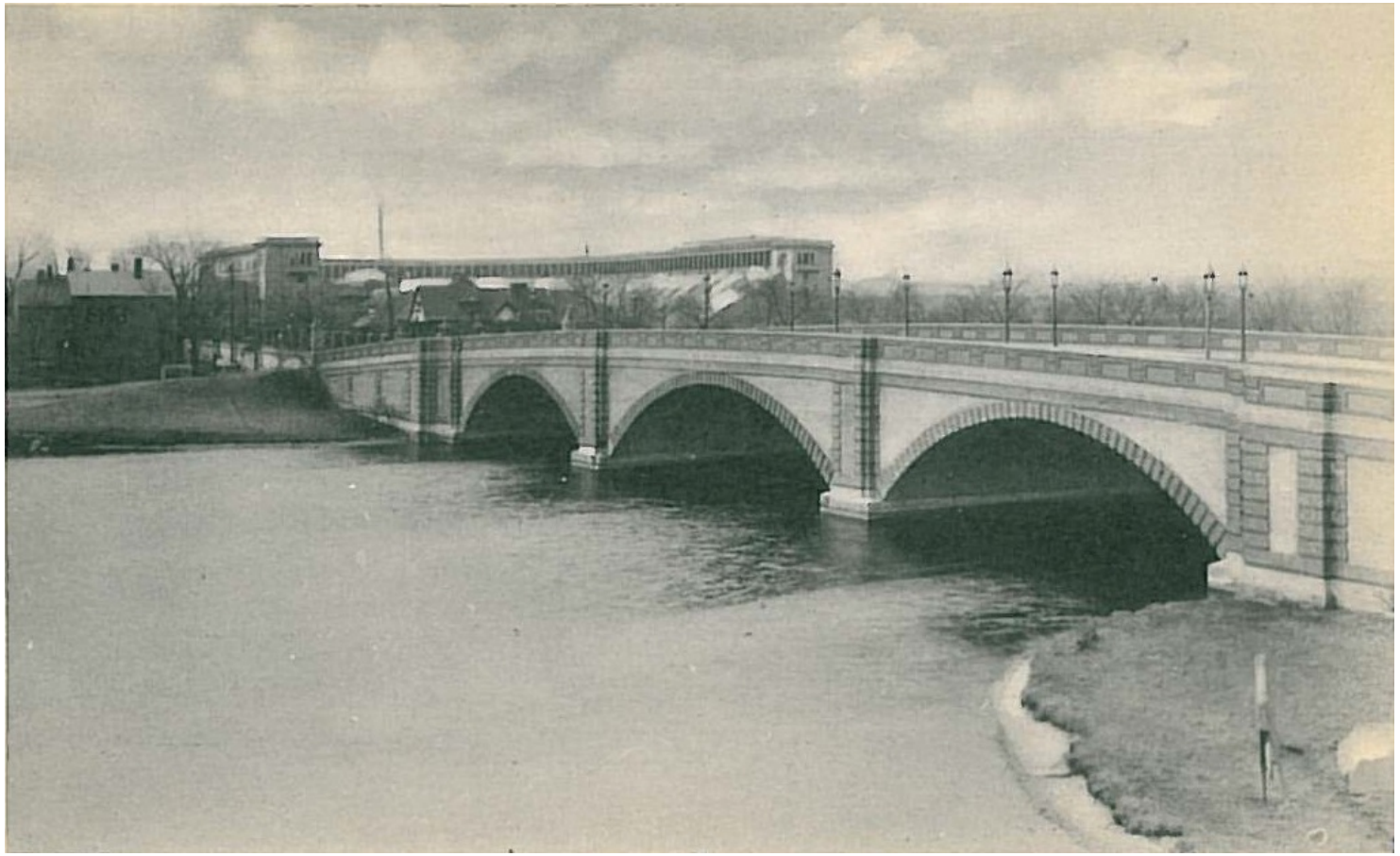
Landscape Restoration

Existing Conditions



Restore park landscape after bridge rehabilitation and stormwater treatment in manner consistent with goals of DCR Master Plan for the Charles River Basin.

Landscape Restoration



In 1915, park users had clear views to bridge and grassy banks.

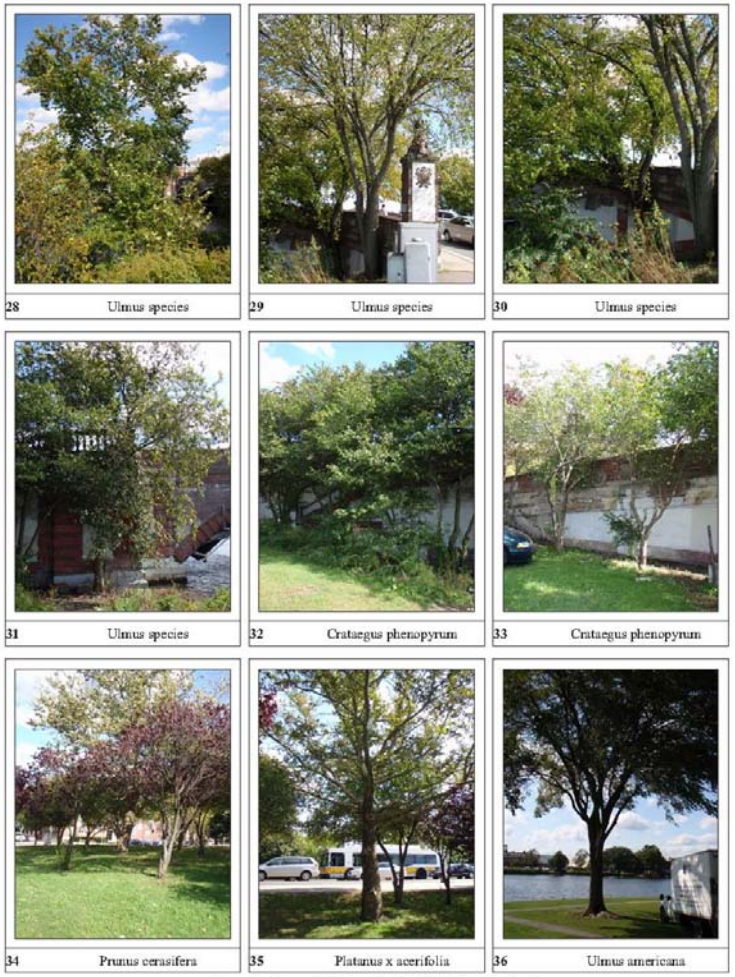
95 years later – Tree Inventory

Trees have been planted over time.

Invasive trees such as Norway Maple, Common Buckthorn and Mulberry have seeded themselves, as have native trees such as Elms and Crabapples.

Trees now grow at bridge foundation, in armor stone, in riprap along river.

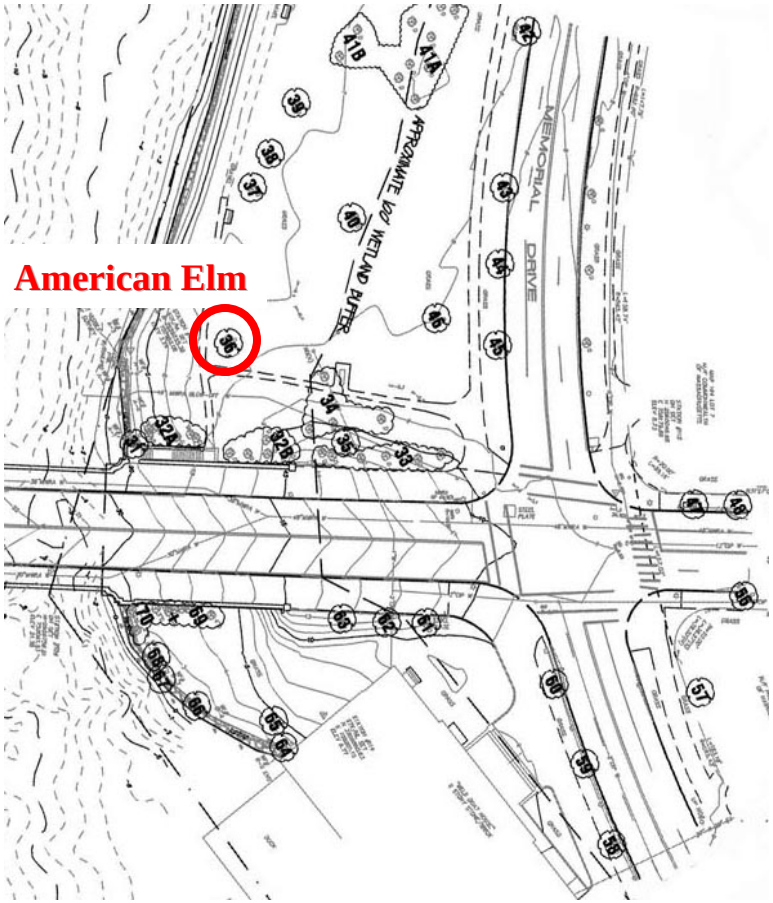
Their condition ranges from poor to good. Dead limbs and compacted soil compromise health of some of the trees.



Larz Anderson Bridge Rehabilitation Project
Inventory of Existing Trees

Special Trees

American Elm,
Ulmus americana



This elm is one, among many examples, of a special tree that requires protection.

Proposed Tree Protection Method

Install tree protection fencing at edge of drip line.

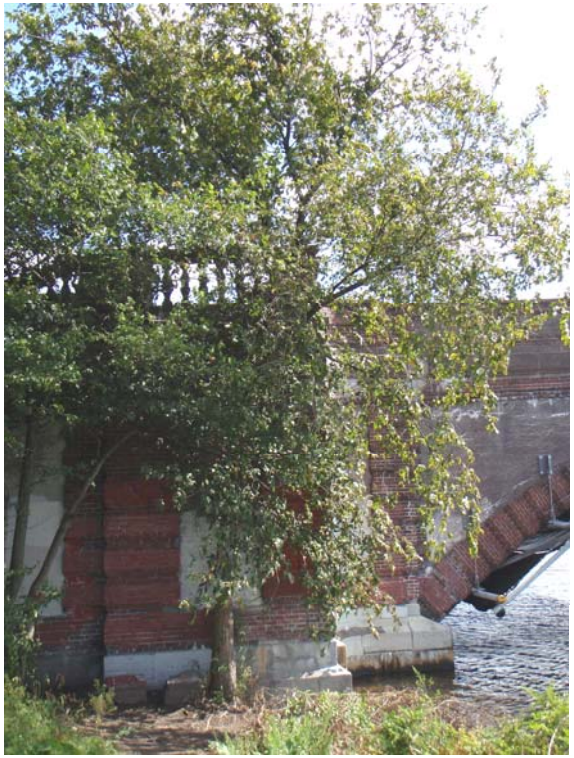
Attach 8’ high 2”x4” lumber to tree within the fenced area.

Trees considered for removal

Location at Bridge Foundation

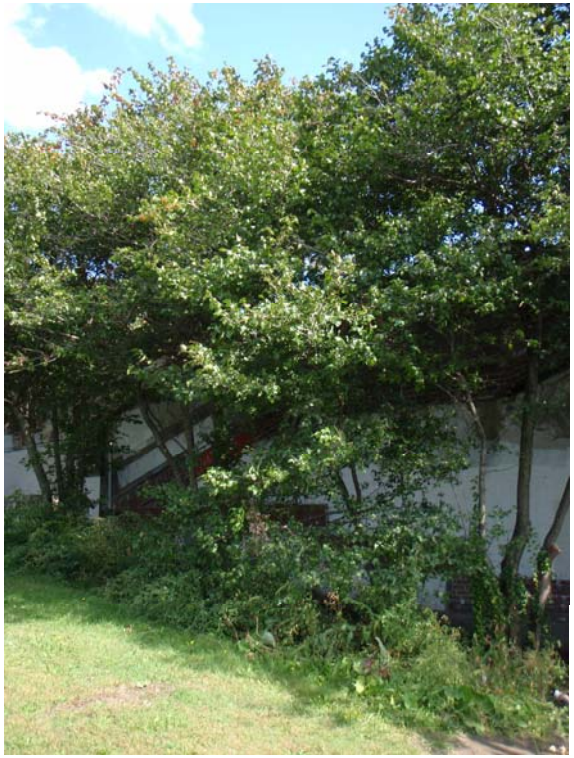
Construction Staging

Public Safety Concerns



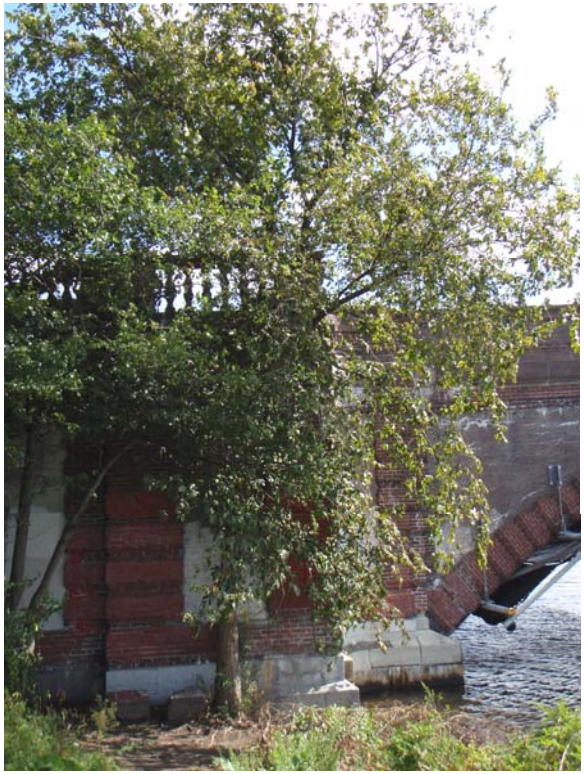
Elm

Kwanzan Cherries



Hawthorns

Trees considered for removal



Elm species

Hawthorn

Some trees at the base of the bridge damage foundation and structure, interfere with repair and create hiding places.

Tree considered for removal

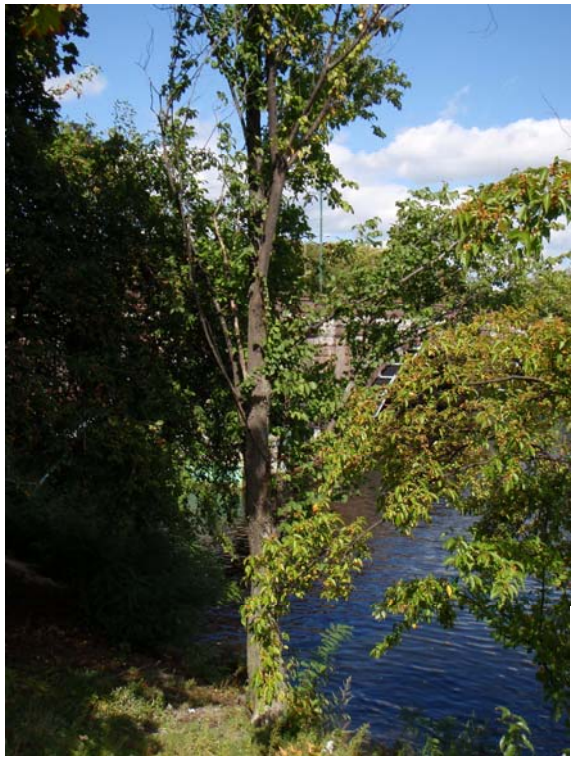
Fair / Poor Condition

Volunteer Invasive

Volunteer Non-Invasive

Sugar Maple

White Mulberry



Elm

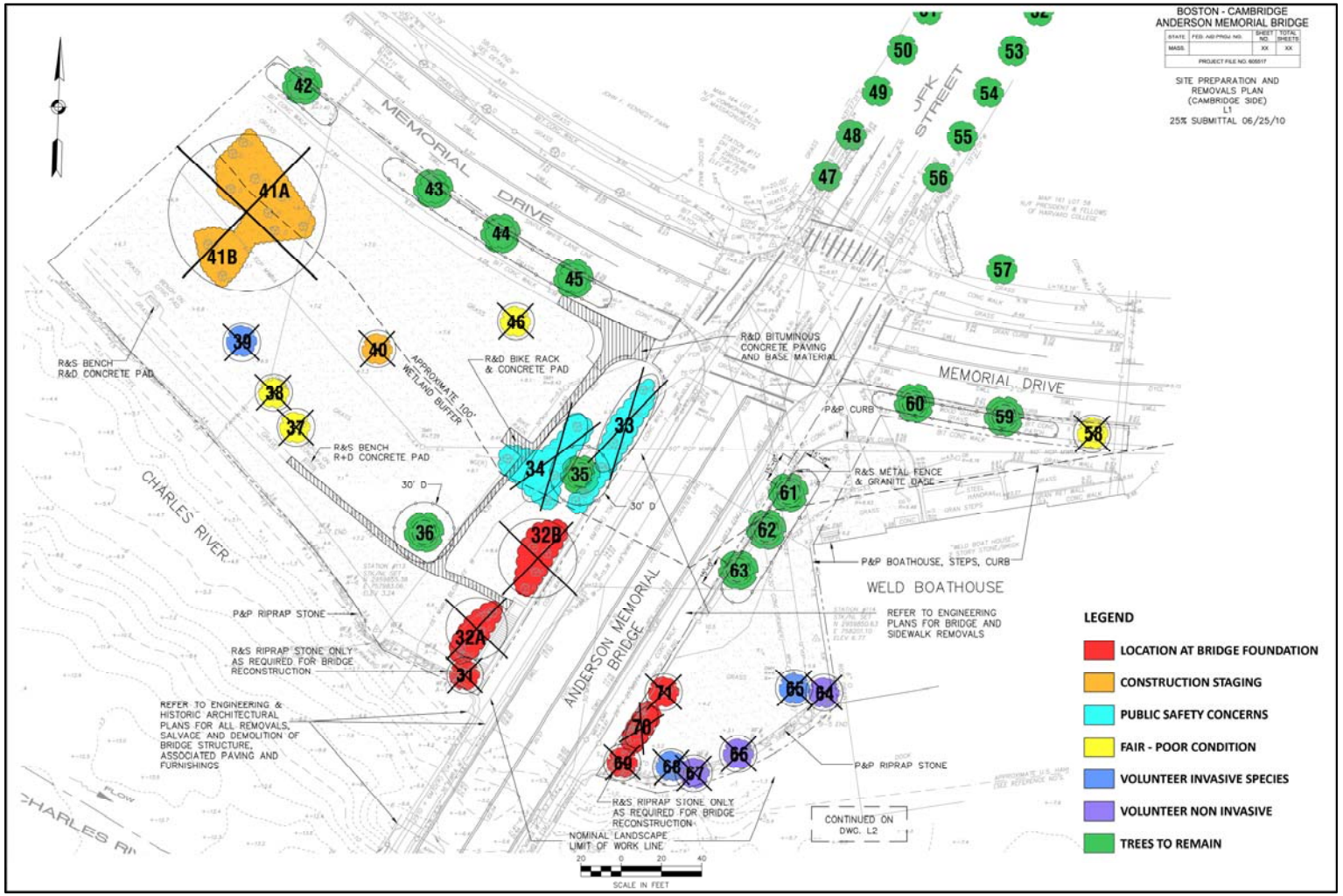
Trees to be Protected

Existing Trees

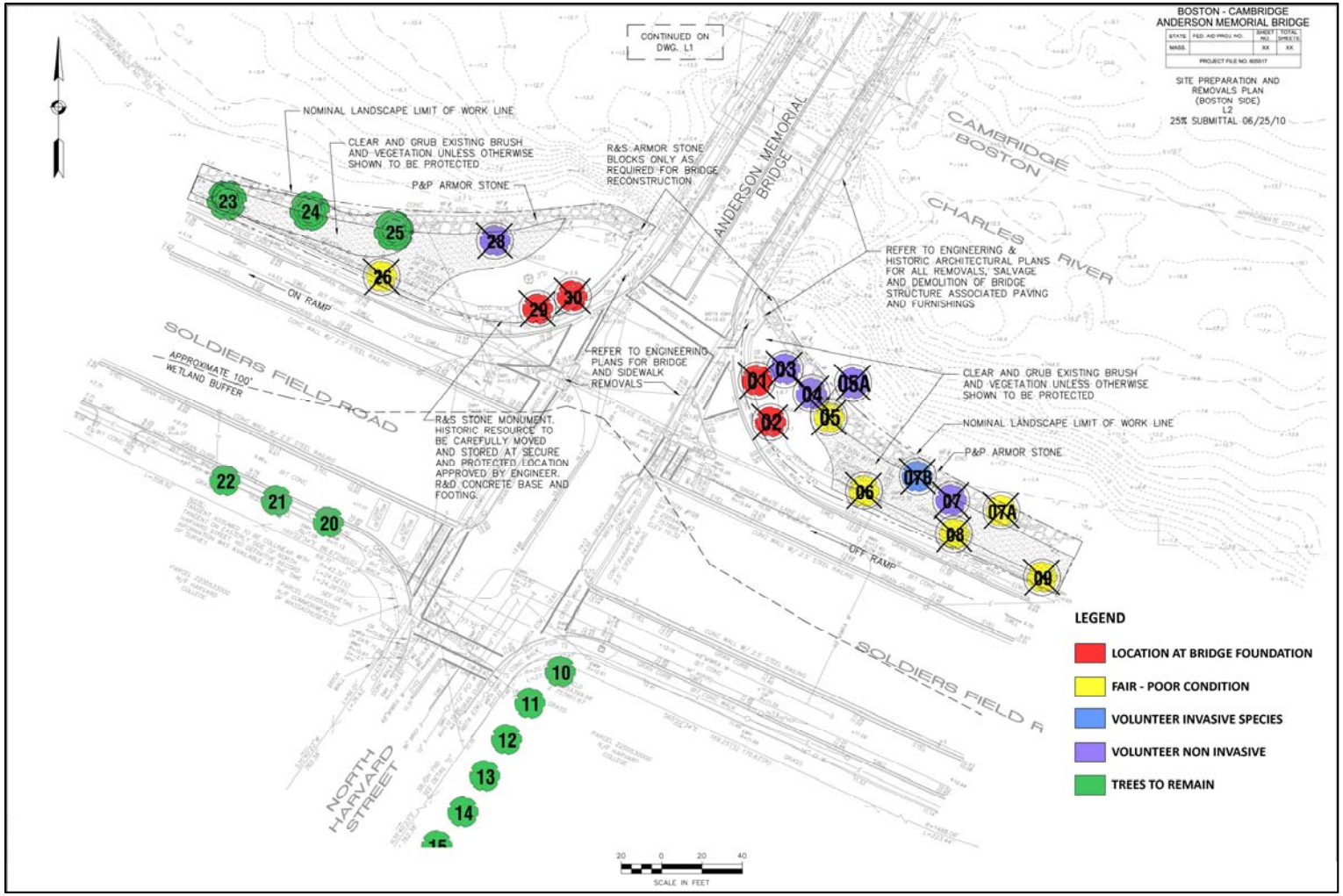
Elm

American Sentry Linden

Trees in Cambridge

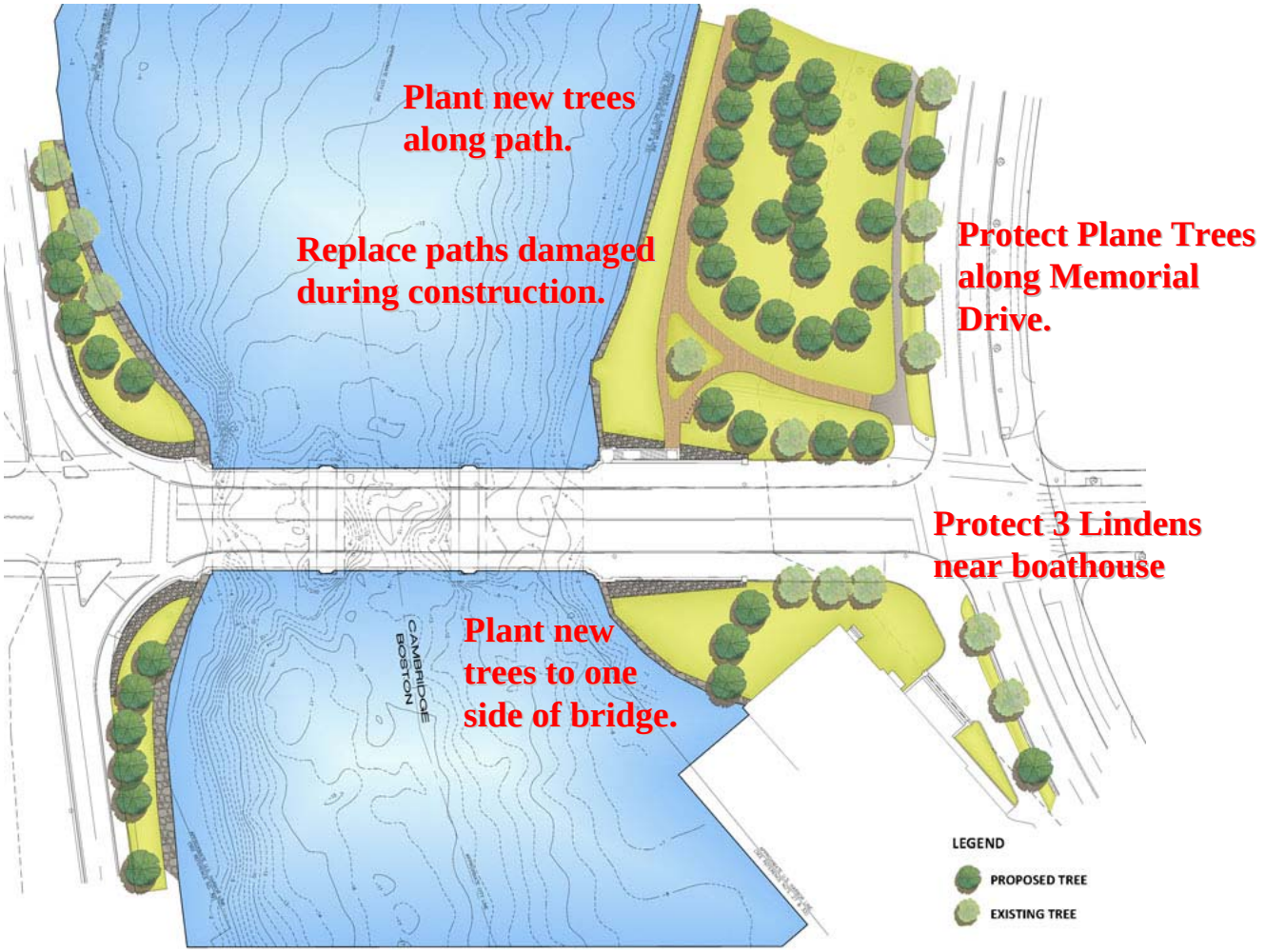


Trees in Boston



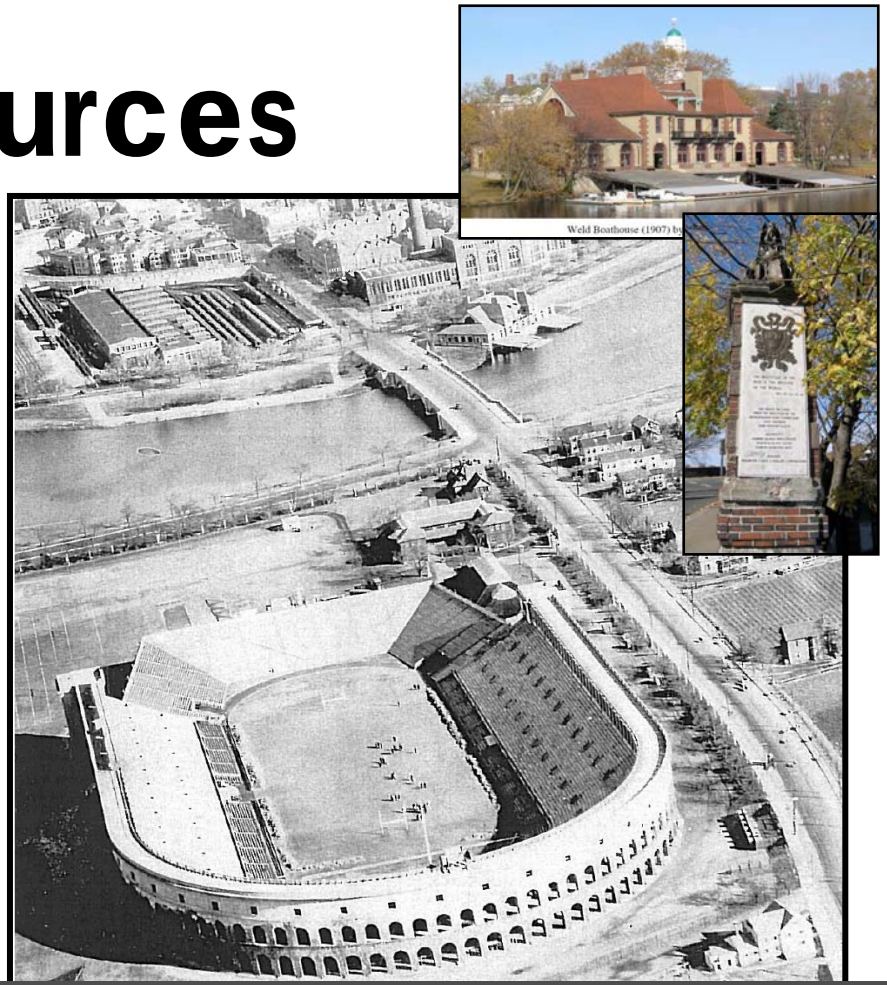
Landscape Restoration

- Plant new deciduous shade trees to replace trees that need to be removed in order to rehabilitate bridge.
- Protect trees to remain.
- Aerate soil.

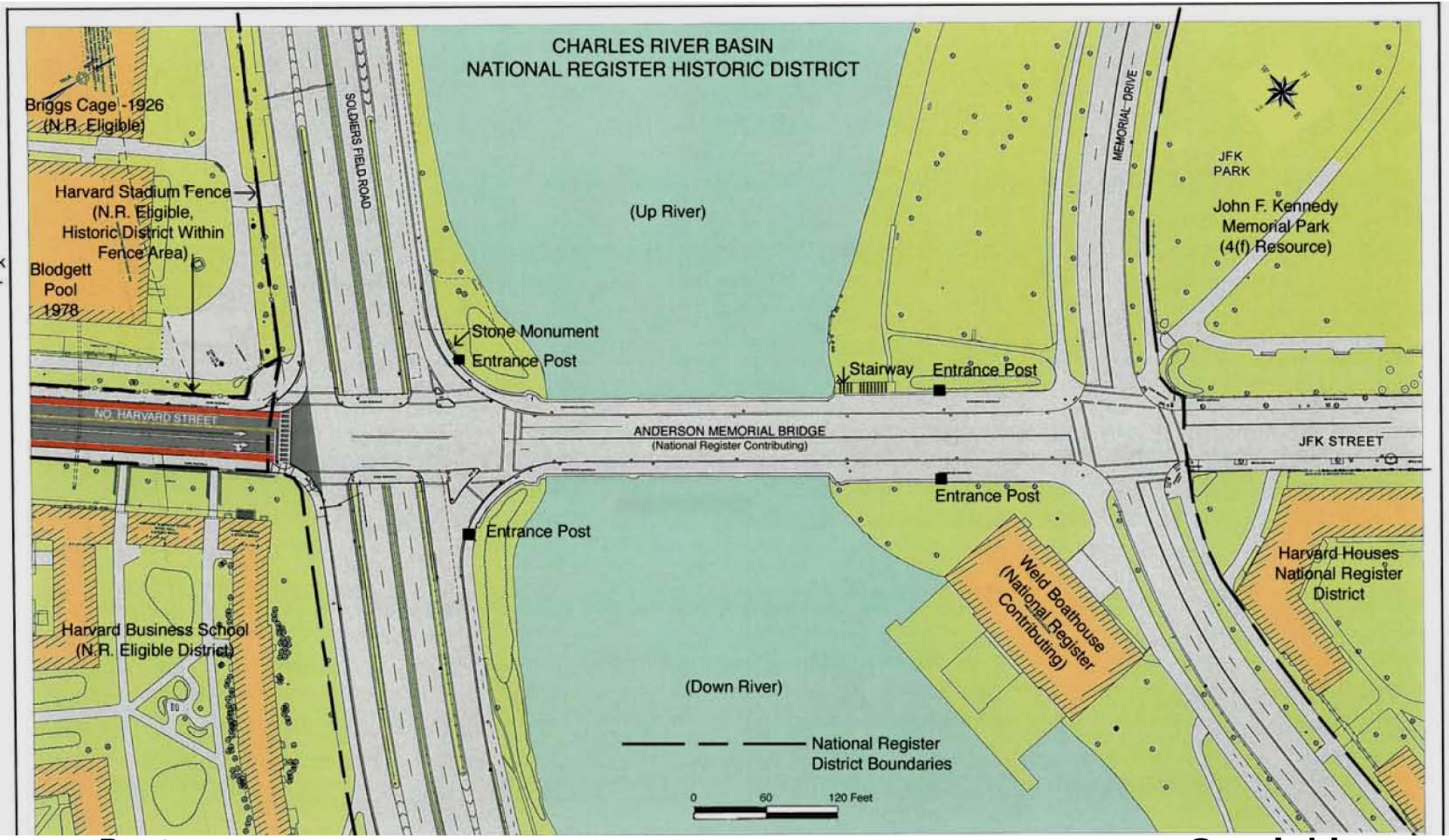


Cultural Resources

- **Entire Area has Historic Significance**
  - Charles River Basin – National Register Historic District
  - Anderson Memorial Bridge
  - Area buildings and structures
  - JFK Memorial Park
- **Rehabilitation must meet the *'Standards for the Treatment of Historic Properties'***



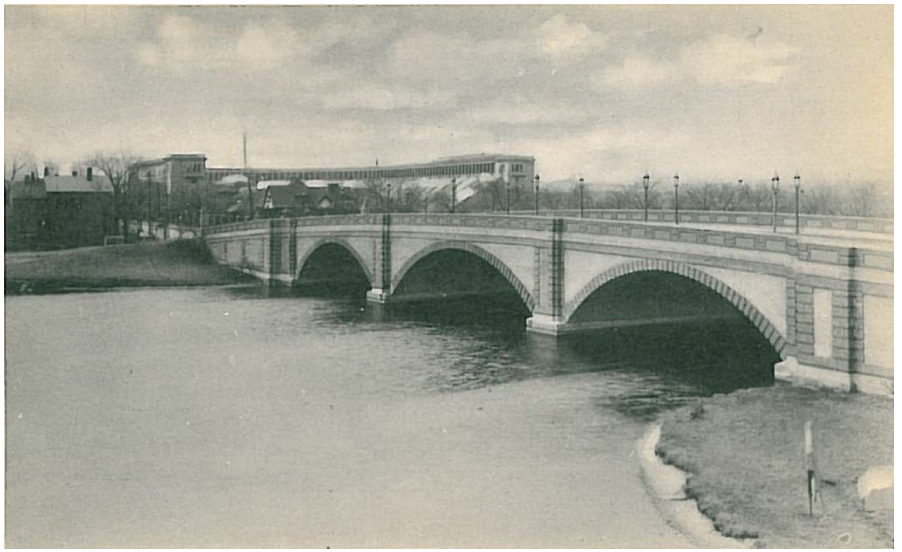
This is the site of the "Great Bridge" (opened in 1662) which was considered the first bridge of consequence built in America.



Cultural Resources Identification Map

Proposed Treatment of Architectural Details

- **Rehabilitation and Restoration Wherever Possible**
  - Concrete Masonry Arches
  - Memorial Marble Tablets and Bronze Sculpture
- **Replication of Original Details Where Rehabilitation is Not Feasible**



ca. 1915 Historic Postcard View

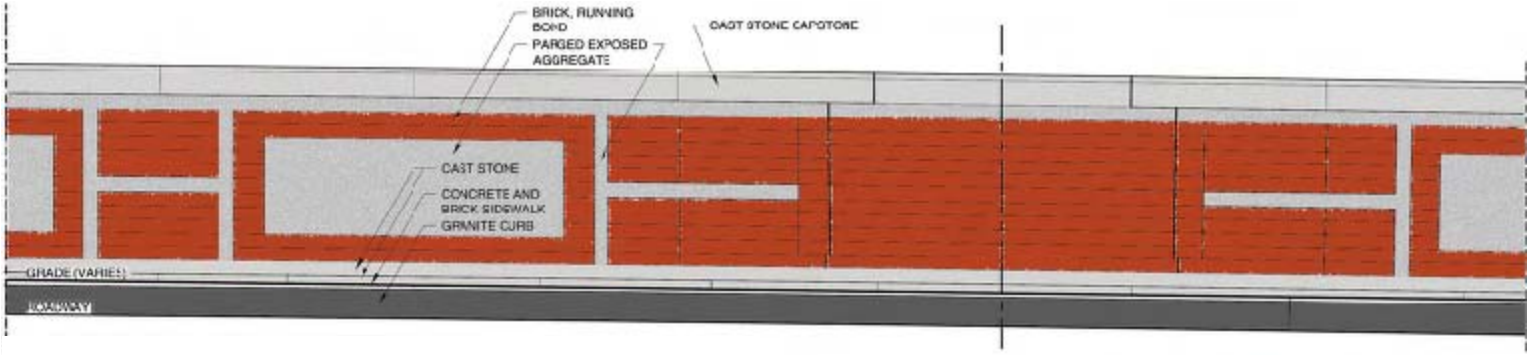
Architectural Details

Spandrel Walls, Piers and Abutments

ELEVATION OF ABUTMENT & ARCH

Architectural Details

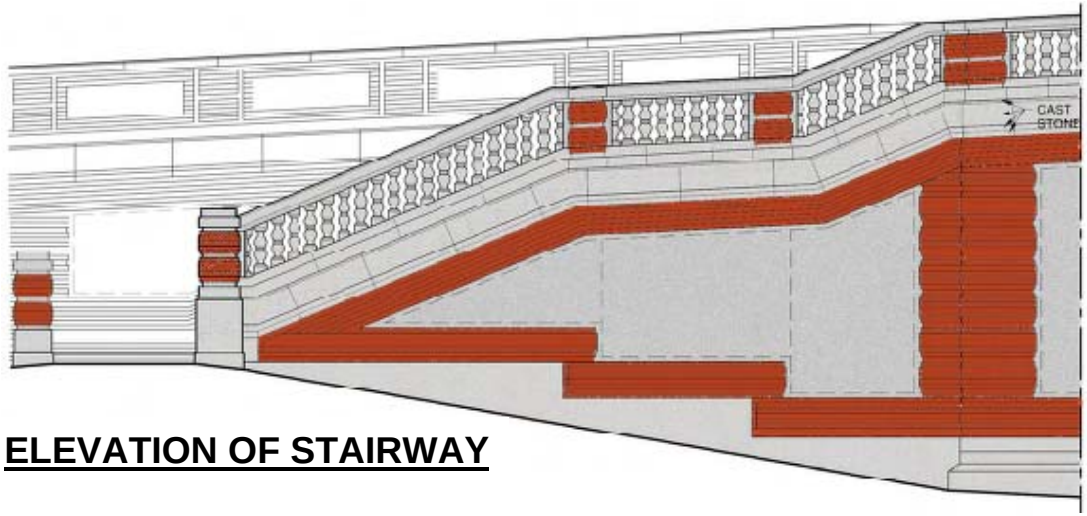
Parapet Walls



PARAPET ELEVATION AT STREET SIDE

Architectural Details

Stair on Cambridge Side



ELEVATION OF STAIRWAY

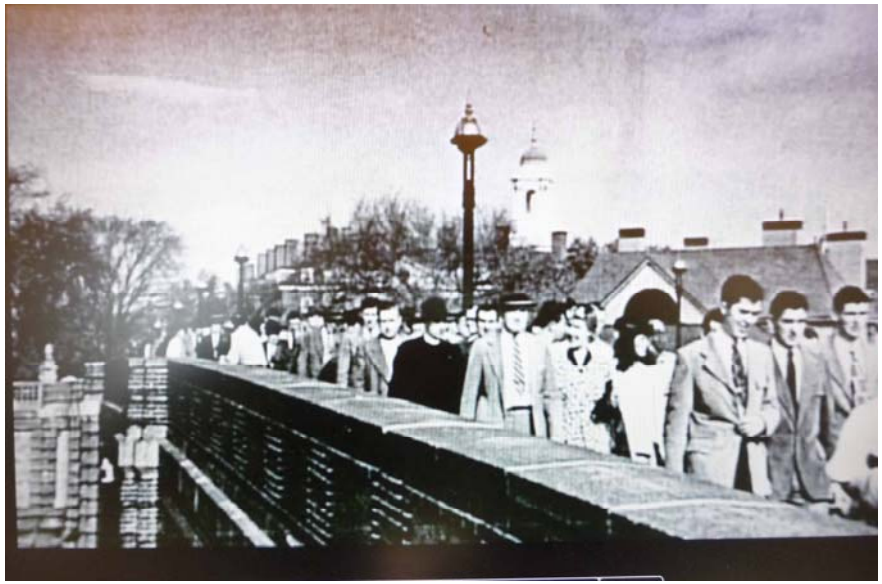
EXISTING DETERIORATED CONDITIONS

Architectural Details

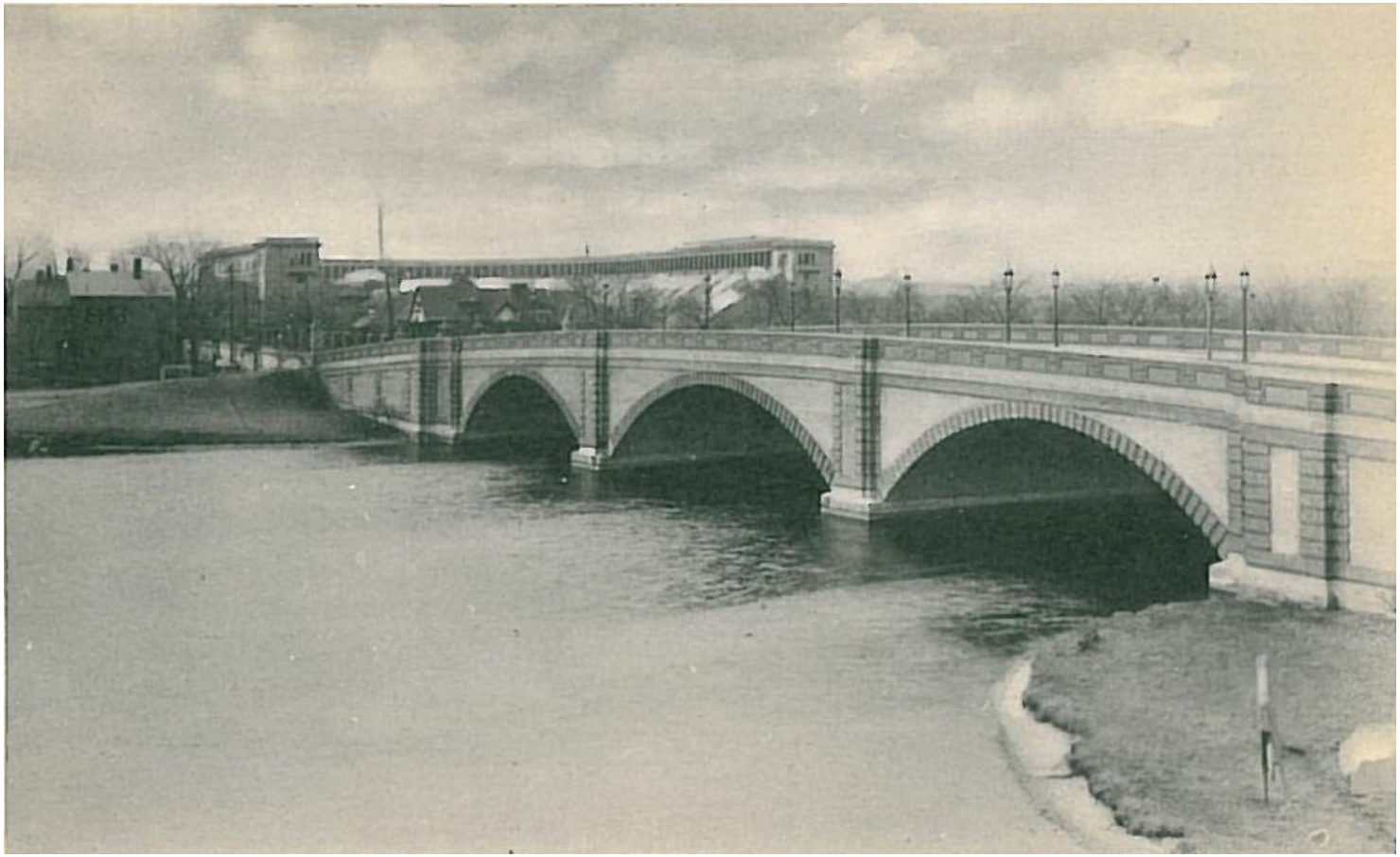
Entrance Posts, Memorial Tablets and Sculpture

Architectural Details

Street Lighting – Historic Photos



Anderson Memorial Bridge



ca. 1915 Historic Postcard

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Discussion